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ABSTRACT

Developed as a multi-county effort, this project sought to design model career education programs involving: (1) Elementary Orientation, (2) Work Experience, (3) Intensive Teaching, (4) Curriculum Development for Underachievers, and (5) Placement and Followup. In addition to improving and evaluating vocational education at the 11th and 12th grade levels, the on-going project is developing an elementary vocational orientation program with the purpose of teaching "job family" occupational opportunities. While the project is only in its first year of operation, significant progress has been made to warrant the recommendation that all components be expanded and that funding be continued for the next 2 years. The six documents comprising this interim report provide an overview and evaluation of the project, the vocational interdisciplinary program (VIP) for each of the four participating schools, and a teaching guide to the elementary career education program. The four VIP teaching guides outline instructional units and include teaching techniques for the laboratory experience, science, mathematics, and communications. It is hoped this project will contribute to the development of a career education program for K-12. (JS)

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INTERIM REPORT

Project No. 0-361-006
Contract No. OEC-0-70-5190(361)

Demonstration Programs
of
Vocational Education

Exemplary Project in Vocational Education
Conducted Under
Part D of Public Law 90-576

Stuart R. Brown
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September 1971

Interim Report

Project Number 0-361-006
Contract Number OEC-0-70-5190(361)

EXEMPLARY PROJECT
in
CAREER EDUCATION
in
SOUTH CAROLINA REGION V

Exemplary Project in Vocational Education
Conducted Under
Part D of Public Law 90-576

The project reported herein was performed pursuant to a contract with the Bureau of Adult, Vocational, and Technical Education, Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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Preface

The Region V Educational Services Center, a consortium type arrangement owned cooperatively by six South Carolina School Districts, has served in the development and implementation of the Project Demonstration Programs of Vocational Education. The Center has a basic staff of five persons which is augmented with the addition of staffs of special projects approved from year to year. The Center assists participating districts in the development of programs in the three major areas of (1) In-Service Education, (2) Specialized Services, and (3) Field Testing/demonstration type curricular development activities. The Center is located in the geographical center of the area being served. The project described herein is considered a field testing demonstration activity.

SUMMARY

The project "Demonstration Programs of Vocational Education" was established as a multi-county cooperative effort to develop model programs of:

1. Elementary Orientation;
2. Work Experience;
3. Intensive Training;
4. Curriculum Development for underachievers; and
5. Placement and follow up.

The participating school districts were Chesterfield, primarily rural, student population 8,965; Lancaster, highly industrial, student population 11,781; Kershaw County, suburban, student population 9,492; and Fairfield County, rural, predominantly black (70%), student population 5,564.

Objectives of the program were:

(1) To increase motivation of 11th and 12th grade students enrolled in specific vocational skill training programs correlating English, Mathematics, Science and a vocational skill training activity.

(2) To train graduating seniors in job entry skills by the provision of opportunities for intensive training designed to meet critical job market needs, student needs, and student abilities.

(3) To assess the extent to which the total educational effort is meeting the needs of students by the provision of an intensive guidance, placement, and follow-up program designed to make provision for the placement of 100% of the high school graduates in further training or employment.

(4) To develop an elementary vocational orientation program whereby elementary school children will learn about job family occupational opportunities by the provision of a developmental occupational orientation program.

(5) To establish line of communication between education and industry by the establishment of a work experience program which allows the vocational student and instructors the opportunity to evaluate the validity of skills being acquired in the educational setting by on the job training.

The project is to be operated for two additional years for a total of three years. During the first year of the project (70-71) goals were primarily developmental and components were operated independently with each district developing one component which was common to all districts and one component which was unique to that district. Components were:

1. Vocational Interdisciplinary Program - All Districts
2. Intensive Training - Chesterfield County
3. Guidance-Placement and Follow-up - Lancaster County
4. Elementary Vocational Orientation - Fairfield County
5. Work Experience - Kershaw County

A coordinator was employed at the Region V Educational Services Center to coordinate administrative, implementation, evaluation, and dissemination activities of the project. In addition one program coordinator was employed in each of the four districts who developed a process for the establishment of one major component in addition to conducting activities in preparation for the implementation of all project components during the 1971-72 school year. The implementation of all activities in each district is the first phase of a move toward the development of a Career Education program in each district grades K-12.

Improvement in most achievement areas was noted in all Vocational Interdisciplinary programs operated. Grade point ratios improved from the previous year in two of the three operating programs. Improvement in student attitude was also noted.

Success in other project components is indicated by the intention of participating districts to implement developed components in full during the 1971-72 school year. Recommendations of teachers, administrators and project coordinators indicate a willingness to expand all portions of the project. The success of the individual components justifies the recommendation that the project be refunded for two additional years to develop all components in each of the participating school districts.

The School Systems

The project components are being implemented in four school districts. Each district has chosen target schools to be included. Served during the present school year were:

Lancaster Senior High School, 9-12 (VIP and Placement and Follow-up)

Camden Senior High School, 9-12 and Kershaw County Area Vocational School (VIP and Work Experience)

Chesterfield High School, 10-12 (VIP and Intensive Training)

Winnsboro High School, 10-12, (VIP) and Gordon, Everett and Mt. Zion Elementary Schools K-7 (Elementary Orientation)

Approximately 40,000 total students are enrolled in the participating districts. Approximately 8,000 students are enrolled in the 1970-71 target schools. Expenditure per pupil in the districts for non federal funds is:

Kershaw County	$493.85
Fairfield County	384.08
Chesterfield County	422.64
Lancaster County	426.69

On the school districts served there are three area vocational training schools with students being transported to skill training and returning to the parent school for academic training. One participating school is a comprehensive high school.

Component 1 - Vocational Interdisciplinary Program

I. Objective: To increase motivation of 11th and 12th grade students enrolled in specific vocational skill training programs by the provision of interdisciplinary programs correlating English, Mathematics, Science and a vocational skill training activity.

II. Process: The implementation process for the interdisciplinary program differed in some respects in each district. For this reason the process and procedures followed in each district will be discussed separately.

A. Chesterfield: A team of teachers consisting of one mathematics, one language arts, one science, and one electronics-electricity teacher worked together during the month of August 1970 and outlined a sequential coordinated program interrelating these subject areas. Preliminary drafts were prepared and utilized by teachers during the school year. Notations were made in the program outlined during the year. Specific behavioral objectives were developed for students and for each unit. Teachers were given a common planning period and met to discuss implementation plans and student problems during the school day. Students were assigned to the program from a group of volunteers at the eleventh grade level on the basis of potential ability and achievement test scores. Students of average or higher ability who are achieving below grade level were selected for participation. Twenty-four students were assigned to the program. One student was lost during the year through death in an automobile accident.

Workshops were held during the school year for teachers to exchange ideas with teachers from other participating schools.

Two sessions were held to assist teachers in developing skills in writing behavioral objectives. At the conclusion of the school year, teachers revised the program guides based on actual classroom experiences and activities. (Copies of the Guide are attached).

B. Lancaster: The Lancaster team consisted of one mathematics, one English, and one electronics-electricity teacher. A science teacher for this team was not available due to late funding. Teachers worked during the month of August 1970 and outlined a sequential coordinated program interrelating these subject areas. Preliminary drafts were prepared and utilized by teachers during the school year. Specific behavioral objectives were developed for students for each unit of instruction. Pretests were developed for each unit and were utilized to focus instruction on the actual areas of weaknesses demonstrated by students. Teachers did not have a common planning period but utilized lunch hours in order to coordinate team activities.

Students who were enrolled for Electricity-Electronics II were automatically assigned to the program. Sixteen students were assigned the majority of whom were of average or higher ability but whose grade averages were C- and D. Classes met five days per week with one hour in communications, one hour in mathematics and two hours in electronics-electricity. Students were given an option to withdraw from the program at the end of one semester. One student elected to withdraw leaving a total of fifteen participants.

Teachers participated in workshop sessions during the school year. Opportunities were given for teachers to exchange ideas with teachers from other schools. Two sessions were held which were designed to assist teachers in developing skills in writing behavioral objectives. At the conclusion of the school year teachers revised program guides based on actual classroom experiences and activities. (Copy attached). After studying various approaches, teachers determined that a contractual - peer teaching approach would best suit the needs of the program and initiated efforts toward developing contracts to be utilized during the 1971-72 school year.

C. Fairfield: The Winnsboro High School team consisted of one mathematics, one English and one Electronics-Electricity teacher. The late notification of funding necessitated the drafting of both teachers and students. Two teachers worked during the month of August to develop a program outline. They were joined later by the third teacher. Preliminary drafts of the program were prepared and utilized by teachers during the school year. Notations were made in program outlines during the school year. Behavioral objectives were developed for each unit of Instruction. Teachers did not have a common planning period and met after school to plan and coordinate team activities. At the conclusion of first semester, the English team member left the school district for graduate study. An English teacher new to the district was employed and assigned to the team as a replacement.

Nine students whose achievement test scores indicated a need for special attention were assigned to the program. Most students grades for the previous year were an average of C- and D. No students withdrew during the school year.

Teachers participated in workshop sessions during the school year. Opportunities were given for teachers to exchange ideas with teachers from other schools. Two sessions were held which were designed to assist teachers to develop skills in writing behavioral objectives. At the conclusion of the school year teachers revised program guides based on classroom experiences and activities.

D. Kershaw: One team was chosen as an implementation team for the Camden High School, consisting of one mathematics, one English, one science and one machine technology teacher. A second planning group was selected consisting of one electronics and one science teacher who were to observe the operation of the machine technology program and be prepared to implement a second program component during the 1971-72 school year. Preliminary drafts were developed by both groups. The Machine Technology VIP group revised the guide during June 1971. (Copy attached).

A development in schedule problems in the Camden High School necessitated the postponement of implementation plans for both groups. Both teams will implement during the 1971-72 school year.

III. **Evaluation:**

A. Chesterfield: Evaluation of the VIP student achievement was accomplished through the use of the California Achievement Test. A matched control group was selected from 11th grade boys not participating. A pre-test was administered to both experimental and control groups in September, 1970 and a post test in April 1971. In addition a comparison of grade point averages from participants grades for 1969-70 and 1970-71 was accomplished. Student reactions to program techniques and methods were solicited.

Table I, on page 6, summarizes the results of the California Achievement Tests - pre and post - for both Experimental and Control groups. Analysis of the results indicated achievement of the experimental group was superior in all phases measured by this test although differences were not statistically significant.

A comparison of Grade Point averages for participating students (Table II, on page 7` for all grades for the 1969-70 school year and the 1970-71 school year reveals a gain of .39 for the 1970-71 school year.

Student responses are included as Appendix A.

B. Lancaster: Evaluation of the VIP student achievement areas accomplished through the use of the Metropolitan Achievement Test. A matched control group was selected from 11th grade boys not participating. A pre-test was administered to both experimental and control groups in September 1970 and a post test in April 1971. In addition a comparison of grade point averages from participants grades for the 1969-70 and the 1970-71 school years was accomplished.

Table III, on page 8, summarizes the results of the Metropolitan Achievement Tests - pre and post - for both experimental and control groups. Analysis of the data indicates a statistically significant (.05) difference in gain for the experimental group compared to the control group in the area of spelling. Slight gains for the experimental groups were demonstrated in Word Knowledge and Language. The control group demonstrated a slight gain in the areas of reading, math computations, math concepts and math problem solving. The gains demonstrated by the control group in mathematics appear to be directly related to unusually low percentile ranks on the pre-test.

TABLE I

Chesterfield VIP Evaluation

SUMMARY

			Read Voc	Read Comp	Arith Reas	Arith Fund	Mech Eng	Spell
PRE TEST	EXP	Mean	8.74	8.88	8.63	8.66	8.96	9.38
		St Dev	1.79	2.10	1.43	2.03	1.73	2.18
		%ile	19	21	22	24	16	25
	CON	Mean	10.01	9.74	8.63	8.70	10.13	10.12
		St Dev	1.95	1.61	1.61	2.19	1.78	2.43
		%ile	34	34	22	24	35	35
POST TEST	EXP	Mean	9.31	10.09	9.27	9.29	10.07	10.89
		St Dev	1.81	2.17	2.00	2.36	1.94	2.33
		%ile	18	30	24	27	27	36
	CON	Mean	10.37	10.23	9.10	9.01	10.66	9.88
		St Dev	2.10	2.45	1.72	2.35	2.27	2.76
		%ile	27	34	24	24	34	24
DIFFERENCE	EXP		.57	1.21	.64	.63	1.11	1.51
	CON		.36	.49	.47	.31	.53	-.24

TABLE II

GRADE POINT AVERAGES

CHESTERFIELD VIP.

Name	1969-70	1970-71	Difference
Donnie Blackwell	1.50	1.34	- .16
Pete Dixon	1.00	1.40	+ .40
Robert Lee Gainey	1.40	3.00	+1.60
Nelson Gardner	2.33	3.00	+ .67
Tim Grant	2.00	2.60	+ .60
Danny Gulledge	1.40	2.20	+ .80
Mickey Hinson	-	1.80	+1.80 (1 yr.)
Carroll Hodge	2.80	3.60	+ .80
Calvin Huntley	1.20	1.00	- .20
James Jackson	1.20	1.00	- .20
Wilburn Johnson	1.33	2.40	+1.07
Albert McBride	2.40	2.40	-
Michael Melton	1.00	2.40	+1.40
Kendell Moore	2.00	3.20	+1.20
Danny Oliver	1.50	2.20	+ .70
Jed Oliver	1.17	0	-1.17
Johnny Purvis	2.80	3.60	+ .80
Dennis Rivers	2.40	2.80	+ .40
Steve Rivers	2.33	3.00	+ .67
Terry Sellers	2.20	2.80	+ .40
Kenny Shaw	2.80	3.00	+ .20
Mickey Short	2.80	3.00	+ .20
Daryl Smith	2.20	1.80	- .40
Larry Smith	1.00	.67	- .33
Mean	1.85	2.24	+ .39

TABLE III

LANCASTER VIP.

SUMMARY TABLE

Metropolitan Tests

			Word Know	Reading	Language	Spelling	Math Comp	Math Conc	Math Prob Solv
PRE TEST	EXP	Mean	96.40	96.93	98.73	91.53	107.13	96.40	108.00
		St Dev	10.77	7.36	6.02	9.64	10.96	6.10	9.10
		%ile	52	50	52	28	58	46	62
	CON	Mean	86.64	82.14	89.29	97.14	89.14	84.50	96.07
		St Dev	13.01	17.34	9.91	11.64	15.19	14.45	12.33
		%ile	29	20	30	46	13	16	28
POST TEST	EXP	Mean	101.33	98.73	99.53	100.80	106.67	100.93	108.07
		St Dev	8.16	9.56	6.76	9.13	7.72	7.69	9.32
		%ile	64	58	56	52	56	56	62
	CON	Mean	86.64	90.35	89.07	95.07	96.50	90.07	96.36
		St Dev	15.60	14.57	12.69	13.23	12.30	11.17	11.73
		%ile	29	34	30	40	22	28	28
DIFFERENCE	EXP		4.93	1.80	.80	9.27	- .46	4.53	.07
	CON		.00	8.21	- .22	-2.07	7.36	5.57	.29

A comparison of grade point averages for all grades of participating students for the 1969-70 and 1970-71 school years reveals a mean gain of a .70 for the VIP students for the 1970-71 school year.

C. Fairfield: Student Achievement was measured by use of the Comprehensive test of Basic Skills. A pre and post test method with no control group was utilized. A comparison of grade point averages for 1969-70 1970-71 was accomplished.

Table V, on page 11 , indicates a statistically significant gain in mathematical computation. Other slight gains were demonstrated in Vocabulary, Composition, Expression, Spelling, Mathematical Concepts and Mathematical Applications. Regressions were noted in Language mechanics and reference materials.

Table VI, on page 12 , indicates the grade point averages for participants. While two students demonstrated a gain in Grade Point Average, the majority showed a regression. A mean loss of .16 was demonstrated.

IV. Conclusions:

The objective was to increase the motivation of 11th and 12th grade students enrolled in specific vocational skill training program. In two of the three programs operated, grade point averages of the students' yearly grades compared to the previous year showed a marked increase for the 1970-71 school year. Student enrollment remained constant through the year with no students dropping out of school among VIP students. Student Achievement showed a marked gain in all operating programs. When compared to control groups greatest student gains in the VIP program appear to be in the areas of Spelling and Vocabulary. These assessments coupled with teacher and student verbal responses clearly indicate that motivation has been increased for the fifty students enrolled in VIP for 1970-71.

TABLE IV

GRADE POINT AVERAGES

LANCASTER HIGH SCHOOL VIP

Name	1969-70	1970-71	Difference
Rusty Barrineau	1.00	1.00	-
Eddie Eubanks	1.00	1.50	+ .50
Lynn Ghent	1.50	2.50	+1.00
James Holden	1.00	.50	- .50
Ray Horton	1.00	1.50	+ .50
David Knight	1.50	3.00	+1.50
Steve McCowan	1.00	1.50	+ .50
Bruce McCoy	2.00	2.50	+ .50
Terry Pate	1.00	1.00	-
Steve Roddey	1.50	2.00	+ .50
Eugene Stroud	1.50	2.00	+ .50
Kenneth Threatt	1.50	2.50	+1.00
Barry Timmons	1.50	2.00	+ .50
Johnny Usher	1.00	3.50	+2.50
Jimmy Williams	1.00	2.50	+1.50
Mean	1.26	1.96	+ .70

TABLE V

SUMMARY

WINNSBORO HIGH SCHOOL VIP.

		Vocab	Comp	Mech	Expres	Spell	Comput	Concep	Applic	Ref Mat	Graph Mat
PRE TEST	Mean	23.17	27.33	13.33	15.00	16.00	23.43	15.71	10.43	12.57	14.86
	St Dev	7.22	7.78	4.42	7.14	6.48	12.93	6.63	4.95	4.56	5.17
POST TEST	Mean	25.00	28.17	13.17	18.00	16.33	33.43	17.29	10.86	11.57	16.71
	St Dev	7.68	9.14	4.37	5.89	6.90	9.39	5.55	3.68	3.85	6.20
DIFFERENCE		1.83	.84	-.16	3.00	.33	10.00*	1.58	.43	-1.00	1.85

TABLE VI

GRADE POINT AVERAGES

WINNSBORO HIGH SCHOOL VIP

Name	1969-70	1970-71	Difference
Larry Montgomery	3.20	3.00	- .20
Roger Segars	1.66	2.00	+ .34
Robert Squirewell	2.66	3.00	+ .34
Mack McCants	2.33	1.75	- .58
Kennith Belton	2.00	2.00	-
Frank Perry	1.00	1.00	-
Ed. Belton	1.00	.50	- .50
Bobby Able	1.50	.85	- .65
John Irby	1.40	1.25	- .15
Mean	1.86	1.70	- .16

Component 2 - Intensive Training

I. Objective: To train graduating seniors in job entry skills by the provision of opportunities for intensive training designed to meet critical job market needs, student needs, and student abilities in the specific geographic area.

II. Process: A coordinator was employed who developed processes and procedures for the implementation of an intensive training program. This coordinator served in a liaison capacity between business and industrial concerns and the school. An index file on businesses was prepared in order to pinpoint the job market needs in the area served by the Chesterfield High School.

A survey of all high school seniors was conducted in Fall, 1970, to determine future plans and aspirations of students following graduation from high school in June 1971. The High School Guidance Department assisted and conducted all aspects of the survey process. Upon completion of the survey students were categorized as to future plans. Students in the following categories were counseled about the opportunities through the project.

1. Students who had no plans;
2. Students planning to seek employment but who had no skill training; and
3. Students indicating plans to attend post secondary training but who had taken no action toward making application.

Of the one hundred twenty graduating seniors, fifty-two were classified in the above categories. Intensive counseling sessions were conducted in which students were informed of the objective of the project activities. Opportunities were provided for exchange between students, counselor and coordinator. Industrial leaders were consulted about job market needs. Assessments were made of students interests and aptitudes using the General Aptitude

Test Battery. Field trips were held which provided for students to visit job sites before making the final decision concerning the type of training which he or she would take. With consideration given to interests, aptitudes and needs of students and to job availability three intensive training opportunities were established. These were power sewing, machine repair and teacher aides. A ten week course was established for each activity.

Industrial Power Sewing

Local sewing industries contributed sewing machines for use in the program. Machines were installed in an empty classroom in the Edwards Primary School. Students attended three evening training sessions per week and were instructed by one of the supervisors from a local company which utilizes power sewing. Sixteen students were enrolled.

Teacher Aide

An instructor was employed who developed an instruction program which utilized a once a week seminar followed by a four day practicum in the classroom. Sixteen classroom teachers volunteered to assist in utilizing teacher aide trainees for a minimum of one hour per day for the ten week training period. A program outline was prepared and issued to teachers who in turn permitted trainees to participate in those specific activities during the class period. A total of twenty-one students were enrolled in the teacher aide program.

Machine Repair

Utilizing machines donated by the sewing industry a machine repair course was structured. A practicing machine repair mechanic was employed for ten weeks as the instructor. Participants were able to disassemble, reassemble, and pinpoint mechanical problems associated with the power sewing machines. Thirteen students were enrolled in the machine repair [illegible] activity.

III. Evaluation:

Evaluation of the intensive training component was accomplished by:

1. Comparison of number of students identified needing intensive training with actual number enrolling.

   A total of fifty-two (52) were identified who needed intensive training from a total graduating class of one hundred and twenty. (43.3%). Of these a total of fifty (96.1%) enrolled for training.

2. Comparison of number enrolling with number completing training and receiving certificates.

   A total of 45 students or ninety percent (90%) of students enrolled received certificates on completion of the training. These were:

   16 - Power Sewing
   8 - Machine Repair
   21 - Teacher Aides

3. Comparison of number completing training with number of persons entering employment in area for which he was trained.

   Figures for employment are incomplete at the present time due to the late employment dates for teacher aides in the school district. Figures presently available indicate that 100% of the power sewing trainees have been employed. Six of the eight machine repairmen have been employed. Figures are presently unavailable concerning employment of teacher aide but district officials indicate that job preference is being given to teacher aides trained in the project activities. Follow-up activities during the second year of the project are expected to include the employment data on teacher aides.

4. Job satisfaction of the student and job performance as reported by employers.

   Follow-up activities to include a survey of persons trained will be asked to respond to questionnaires concerning job performance of persons trained.

IV. Conclusions:

Fifty-two students or forty-three per cent (43%) of the graduating class of Chesterfield High School were identified as needing intensive training. Of this number 50 were enrolled for training and 45 completed training programs. Percentage of actual job placement and job satisfaction will be determined during the 1971-72 school year through follow-up activities.

Component 3 - Guidance-Placement and Follow-Up

I. Objective: To assess the extent to which the total educational effort is meeting the needs of students by the provision of an intensive guidance, placement, and follow-up program designed to make provision for the placement of 100% of the high school graduates in further training or employment, and to conduct follow-up activities designed to assess the extent to which the education and training provided is meeting needs of students.

II. Process: A coordinator was employed for the Lancaster City Schools attendance area to develop a placement and follow-up program for graduating high school seniors. An attempt was made to coordinate activities of the guidance department. A survey instrument for use with high school seniors was developed. The coordinator visited local business and industry to gather information necessary for the placement activities. Surveys of high school seniors were accomplished and students categorized as to future plans and needs for additional assistance in locating employment. The local office of the South Carolina Employment Securities Commission was contacted for assistance in placing graduating seniors.

III. Evaluation: The survey was completed and all permanent records marked as to future plans of students. Students were counseled in group counseling sessions as to possibilities for assistance in securing job placement if they were not going on to post-secondary training and assistance in making application for post-secondary opportunities. From this point problems developed which served to hinder further development of component activities. These problems were related to communication within the district, communication between project personnel, and background and training of the coordinator employed. The school year ended with the placement activities relatively underdeveloped and process and procedures not developed for post high school graduation follow-up activities. The district requested that they be allowed to withdraw from project participation except for the Vocational Interdisciplinary program at the 11th and 12th grades for the 1971-72 school year.

IV. Conclusions: Due to problems of communication which developed during the school year the product objective was not met. Utilizing the relatively underdeveloped procedures of this component other participating districts will revise, revamp, and develop placement and follow-up activities for 1971-72.

Component 4 - Elementary Career Orientation

I. Objective: To develop an elementary vocational orientation program whereby elementary school children will learn about job-family occupational opportunities by the provision of a developmental occupational orientation program.

II. Process: A guidance specialist was employed to work with teachers of three elementary schools in Winnsboro to develop a guide for a developmental program of orientation to the world of work. During the first year of the project, teachers were involved in developing a meaningful guidebook for use in the program.

A representative committee was chosen from the faculties of the schools (two teachers from each grade level) by the faculty members themselves to serve on the committee. Committees reported directly to the total faculties at periodic intervals during the school year. This committee of twelve met eight times during the school year to plan ways to include careers in each aspect of the curriculum. Each school subject, every physical, social, and mental skill, every structured or unstructured education experience were studied for possible relatedness to career orientation. Visits to programs of career education were conducted. All possible information was gathered for study as to the best possible approach for use. A guide book was developed for use in the program. (Copy attached). Members of the study committee concluded that a system of activity-teaching units based on broad careers would best meet the needs of the pupil population. Teachers in workshop sessions would develop their own units based on the following outline:

1. Objective
2. Careers

3. Content
    a. English
    b. Mathematics
    c. Reading
    d. Social Studies
    e. Science
    f. Music
    g. Health

4. Activities

5. Materials

6. Vocabulary

7. Community Resources

8. Informational Resources

9. Teaching Strategies

10. Evaluative Measures

These units would be developed by teachers at various grade levels utilizing the following taxonomy:

7 - Hands-on Exploratory Experience in selected cluster areas.

6 - Environmental Control
    Personal Services
    Consumer and Homemaking
    Recreation
    Manufacturing

5 - Marine Science
    Marketing
    Business and Office
    Communication
    Construction

4 - Transportation
    Agri-Business
    Public Services
    Health Services
    Fine Arts

3 - Environmental Control
    Personal Services
    Consumer and Homemaking
    Recreation
    Manufacturing

2 - Marine Science
    Marketing
    Business
    Communication
    Construction

1 - Transportation
    Agri-Business
    Public Services
    Health Services
    Fine Arts

K - General Orientation To Careers + Mini-Units

Sample units were prepared and operated on a pilot basis during the final weeks of the school year.

III. Evaluation: Evaluation of this component was accomplished by assessing the extent to which the committee developed plans for implementation of a program. A guide book was developed which was prepared and disseminated to all teahers who will be participating in the elementary orientation activities during the 1971-72 school year. Three districts adopted the plans for use in their area districts during the 1971-72 school year. Each district will have activity-teaching units based on the taxonomy listed above.

IV. Conclusions: The study by a committee of all possible approaches to career education led to the development of a plan which was received enthusiastically by teachers in three participating districts. The experience for these teachers has proven to be the catalyst for encouraging teachers to begin to specify objectives in each of their subject areas.

Component 5 - Work Experience

I. Objectives:

1. To establish lines of communication between education and industry by the establishment of a work experience program which allows the vocational student and instructors the opportunity to evaluate the validity of skills being acquired in the educational setting by on the job training.
2. To coordinate the efforts of agencies providing part-time employment for students, such as Distributive Education Cooperative programs, Neighborhood Youth Corp, Community Action agencies, and others in order to assist disadvantaged students to select gainful employment which will insure a type of skill training as well as financial resources in order that they can remain in school.

II. Process: A coordinator was employed in the Camden Area Schools in Kershaw County to develop the aspects of the program. An initial survey was conducted for all high school students in Kershaw County except ninth and tenth grade students at Camden High School. After completion of the survey interested students were asked to contact the placement office. Upon contact with the placement office students were given the Ohio Vocational Interest Survey and had results interpreted to them. Upon completion of the interpretation activities students completed job application forms and were counseled concerning problems which might exist for them in completing actual job applications.

Vocational teachers were given an orientation to the objective for placing students into work situations and techniques for contact with business and industry were discussed.

A coordinated effort was initiated with the local N. Y. C. program. Work experience coordinator and jobs were made available by the N. Y. C. program. A system of student supervisors was developed which provided for the development of leadership capabilities on the part of students.

Contacts with business and industry was effected through the local Chamber of Commerce, The School Vocational-Industrial Advisory Group, and civic groups. Job development was accomplished by the coordinator and an assistant coordinator who was provided by the district through other funds.

III. Evaluation: This was accomplished by determining the number of students placed in each category, the extent to which economically disadvantaged students were placed and employment provided. In the initial survey approximately 360 students indicated that they were presently working. Approximately 900 students indicated a desire to work. Of the original group of students that indicated interest in working, 153 students took the Ohio Vocational Interest Survey and actually made an application for work. Of those 153 students that took the Ohio Vocational Interest Survey, all received an interpretation of the test results.

Approximately 85 students were referred for interviews with prospective employers. Of those 85 students many were referred only once because they received jobs. Many were referred three and four times. On the average the students placed were seen approximately once every other week once they were established at their work site.

This placement program placed 33 students directly into business and industry. This included developing the job initially with the employer, trying to find the appropriate student from the files, and then matching the two factions. The area vocational teachers indicated that they placed 11 students in the local community. A total of 44 students are directly, or indirectly, placed by this office.

Of those 44 placed, the current knowledge is that two (2) people have quit their jobs, and one (1) person was laid off due to lack of business.

A work experience program was initiated with the NYC (Neighborhood Youth Corps) Coordinator. This was an effort to provide counseling for students as they were working. The program consisted of 22 high school senior students. All seniors were from disadvantaged families according to NYC classification. The 22 students selected 4 students from their group that would act as their supervisors. An assistant to the coordinator assisted with the counseling service for these 4 students. The approach was to relate career-oriented, work oriented material to the 4 student supervisors, 2 boys and 2 girls, and have those 4 student supervisors act as liaison and relay that same information to the other 18 students.

Two black students from this disadvantaged work-experience program have been placed in local downtown businesses.

The work experience coordinator worked with four other students on an additional work-experience program. These students have gone into independent private business, selling personalized services. One boy has a business of washing windows. Three other boys have started custom lawn services. The boy washing windows has had numerous experiences learning the techniques of washing windows, dealing with the general public, and printing his own calling cards. It is felt that this work experience, of a special nature, provides built-in responsibility and motivation necessary to fruitfully experience the world of work.

IV. Conclusion: With 44 students being placed in private industry, twenty-two through the N. Y. C. program and four in additional work experience activities, a total of 70 (46.6%) of the 153 students were able to receive work experience.

Recommendations

On the basis of the success in meeting the product goals of the project, it is recommended that:

1. Components be implemented in all participating Districts in 1971-72.
2. Specific behavioral objectives for participating students be developed for each component prior to initiating second year activities.
3. Vocational Interdisciplinary Components be expanded to include other vocational areas and students.
4. Components be molded into a program to be designated as Career Education K-12 to insure the participation of the entire student population in participating schools.

APPENDIX A

STUDENT VIEWPOINTS
OF THE
VOCATIONAL INTERDISCIPLINARY PROGRAM
AT
CHESTERFIELD HIGH SCHOOL

CHESTERFIELD, SOUTH CAROLINA

January, 1971

CHESTERFIELD COUNTY SCHOOL DISTRICT

Student 1.

This program is really a good idea for people who know they are going to take this in college or go into this occupation in years to come. For some people its just another subject. I think it would do a little better if there wasn't so much time spent on one section, and go ahead like regular classes and move on a little faster. It would be better also to try something different instead of going over the same thing until we get tired of it. To me the program is helping, and I enjoy it when we work with certain subjects and learn about things of interest instead of the same thing over and over. I really enjoy the class, but at time it can be a drag. As far as the teachers are concerned their all doing pretty good, but I wish they would explain themselves a little better so we can understand whats going on.

Student 2.

I think the VIP program is important to me because it is very interesting, and it is teaching me a skill. I will admit that when I first got into the program, I did not care too much about, but now that I am learning a trade in high school why get out it.

There are not any of the teachers that I do not like, because they are all leanient with us. Sometimes we sat around and have class discussion about the VIP program. When you work in the laboratory, that is the most important work of the day. When I finish high school, I will have learned a trade and be ready for work unless I want to further my education. I think the VIP program was a good start to help the student learn a trade.

Student 3.

I am enjoying this course more than any other thing I have taken in my school years. I like the teachers because they are thinking of the boys in this course. The lab is well equipted and it is insterting working in the lab. The course would be much better if we could go out and observe first hand the plants and wiring of houses. I think the class should be able to take on projects that would benefit the whole class.

Student 4.

I think that the VIP program was a very good idea. The thing that I like most about the program is that everything is related to the other subjects. This is a great advantage to the students because if you leave one class uncertain of anything you can go the your next class and usually get it straight. This program is the best I have ever taken and it isn't like regular studies. The teachers are not as strict and atmosphere of the class room is usually more cheerful.

Another reason I like this program is because you don't have to stick strictly to books. This makes your classes more interesting and you have an advantage over the other students in your school because you don't have to carry around as many books. In the VIP program you have a variety of things to do.

The most interesting class of all is electricity. Others may not think so but I have the most fun in this class. I think it is a lot of fun to work with electricity and do things such as soldering and wiring. My second favorite class is Math. In this we do not use a book and I really like this. My third favorite class is science. I can truthfully say that I work harder in this class than in anyother. Of all of my courses I believe English is my least favorite but I never did like English.

So far I am very pleased with this course and I hope to take it again next year.

Student 5.

I am not trying to butter it up or down rate the program. Its a program that I think is good for people who is not equip with the good brain to get a scharship to go to college also for people who don't have money to futher their education. I mean most guys get 12 years of education and go get the same job that non-graduate get with the same pay. I feel if I am going to put up with these prisons for twelve years I go to do better and make more money than the non-graduates. To make myself, as well as other know through school I have gotten something to help me get ahead in life. Also in the south being black you go to have some kind of special abilitys to make a good life for yourself. The garanteed job part I like.

Student 6.

I think that this is a good program for anybody who wants to learn about electricity and perpare themselves for the future which you might want to get a job in doing electricity work. I am glad I am in this program. I want to learn tthe trade of electricity and go to learn it to the best of my knowledge. I think that the four teachers who teaches this course are doing a good job.

Student 7

The VIP program can and is a very good program. I believe what you learn could be very valuable to you later on in life. I do enjoy the program I am on, which is the electricity course. I do know that the teachers just do a great job working and teaching a bunch of guys like us, which is not to easy.

Some of the things in electricity are hard to understand. But, we do have some very fine equipment to work with. Our electricity teacher really knows what he's talking about.

The reasons I took the electricity course is because I thought if I wanted to be an electrician this would help me a great deal, and a electrician would be easy to get and would pay pretty good. My father also thought this course would be good for me.

I really like working together, like we do and having most of our subjects dealing with electricity. It is more interesting than taking five or six completely differently subjects.

Student 8.

My honest opinion of the VIP program is that it is a very good program for interested persons in the field of electricity. To me it is very interesting because I enjoy working with things that pertain to this. Industries need people who are educated in this field and any person who has this field as a profession would very likely have a secure job for as long as he wanted to work. The VIP program had a slow start in this school and many became dissatisfied with it but after it go under way most of them began to enjoy it. We have no problems with any of the teachers except the science teacher and the only reason we have problems with him is because he doesn't use his common sense. He teaches everything by the book, nothing he teaches is simple. This is the only reason we have problems with him.

Student 9.

The VIP program is a very instering program. My opinion on it is that I feel that its great. This year is a great year for me because I have learn a lot of things. I have problems in it, because I didn't start out trying at the first of the year like I should have. Now when it come around to passing for the year I think all the teachers should give you credit for what you have done. I feel what I have learn I know it, and want forget it. I also feel that one year is no good without the other. I feel that if a person fell this course I think they should put him back and give him a chance. The teachers are good in teaching this subject, Because they take insterest in you and try you over and over again until you get it, I think that's good also. I'm not trying to brage on it, but I'm saying what I feel. I have troble in VIP science, I don't get clear understanding in it.

I also think in order for a black man to get a good job in the South he have to have everything from brains to ability and that's what I'm try to get out of this program.

Student 10.

I think that this program is good, I like it but there are a few things that I don't like. At the first of the year everything didn't work out like it was suppose to. I don't think that our science teacher is doing his job as a teacher. He teaches as though we were College students. And I don't like it.

Our English teacher is suppose to teach us something relating to electricity but she gives us English 2600 that I think we don't need.

I that our math teacher does his best to help us more than any other teacher. I learn more in there than in most classes. I like doing work in the lab it is very intersting and it is a lot of fun doing experiments.

They told us that we were going to go on field trips through out the year but we have not been anywhere at all. I would like it better if we did more than we do now. I just hope that it gets better.

Student 11.

I feel that the VIP program is the most interesting thing I have ever had in school. I have been making better grades in school on the program. I feel that we should have more programs like this because when a person is interested in something he will study more and learn more from it than he will from something he is not interested in. I think this will do me more good in life than regular school would. I like the VIP program very much. I also think we have some of the finest teacher that could be found. The is one teacher that stands out. he is my math teacher. Everyone respects him very much. He is not like a lot of teachers. He will talk to you about things, he just seems to understand young people. I feel there is a very good understanding between all of us, and this is a very good thing.

Student 12.

The VIP is a very good program. I am enjoying this program very much. I jest hope it will help us when we get out of school

I don't think that this program was all it was ment to be, but they are trying to make it better. At the first of this year and the last of this past year they said how importan this program was going to be. So far it has not beem importan at all.

I don't believe the teachers and the heads of this program are taken enough pride in this program. They told us that we would be going on field trips and be doing think out of school and in School with a lot of interest to us. But we haven't been anywhere and haven't done anything out of school in the field of electricity. We have done some very interresting thing in the lab and I have learn a lot in some classes.

In some classes the teachers care not only about their class but the rest of our classes as well as theirs. They will help us with anythink we ask them. Some of our teacher care only about their class and could care less about our other class wheather we pass or fail.

Student 13.

I think this is a verry goods program what we have this years in our new school. I enjoy this VIP program because I have lean a verry good bit while I have been in this VIP program. I think this VIP should be offer to anyone what would like to be in it. My opianion about the teacher is some of the teacher they will explain thing about this VIP program and you can bring some of our point up in some of our class and some of class teacher will try to explain it and some time some of our teacher don't know what is going own in this program.

Student 14.

I feel that this program is very important to our area. The need of electricians is very needed.

I also feel that this program will help many students stay in school. My opinion of this program is that it can and will help students in the future.

For the student which is interested I feel this is a good course. I hope the school will be able to keep this program. It is important to the school as much to the students. Many students which is on this course has showed an improvement and an enjoyment of this program.

My grades and teachers have showed their like for this program and I believe they would want this program to stay in our school.

The faculty and administration has worked hard to keep this program alive.

The teachers have worked hard together to keep the program interesting. The program was a drag for a while but when everything was ready, we dove in and got to work.

The teachers had a hard time and I beleive they need the help of all and the thankfulness to who how we feel thoward them.

This was a new program to them and us the students.

To all the teacher, I thank them for all the help I received. To me, I have received a lot and this will be a benefit to my future.

I hope this program will continue. The school will receive a good name.

Student 15.

My problem with the VIP program is that I cann't pass electricity. The electricity teacher told me I could pass it, if I pay attention in class. I know about voltage and amperes, but I cann't learn about transformers and what transformers are made of. My problem, I reckon, I wasn't born to be an electrician. I like to take VIP math, VIP English, and VIP Science. The electricity teacher is a very good electricity teacher and I like all my other teacher well.

Student 16.

I enjoy this course very much because of the way you learn. Your're not agravated all the time about getting quite. It is informal and I believe classes should be this way.

I like very much the teachers I have during the day. They don't try to be all that strict on you. I don't like to be held down. I like the electricity lab the most because your not cramped up in a little desk. You can move around and have plenty of room to work.

I getting off the point of how well the course is working. But I just thought I would tell you how I feel about the teachers and working areas.

In this course you learn a lot about electricity but it does get boring hearing day after day nothing but volts, ohms, and am;s, and the strain is beginning to show. If there was anyway possible to go on a trip or get away from electricity for a couple of days. I believe the tension would go down a little. Especially in the science class where day after day we do nothing but problems.

Student 17.

The VIP program seems to be interesting and helpful to the ones who are trying in the program, and so far I like it. I believe that the program would prove to be more interesting to all the boys if we would go out on trips and visit places like electrical plants, and places of that sort. I like all the classes in the program, except the science class. The reason for this is because he gives us a work sheet every day and 8 out of 10 doen't even know what's going on. I mean that he doesn't explain the problems thoroughly enough for us to understand them.

I believe that this program can and will be helpful to alot of the boys in the future, and will give them good jobs and better wages.

Alot of the boys will be out of this program next year, because there will be a beginners class, and this will limit only about 12 seniors in the program. I'm hoping to be in it again next year, because its not a very hard course, and I believe it will be helpful to me.

Student 18.

The VIP program is fine. It will help people get a job when they finish school. But to get a job you have to know the work. To learn the work you have to be interesting in the program. I like the program but the English teacher seems to love to teach English, not English VIP. We Don,t do much in there except work in English 2600 and write papers. I don't see what this has to do with Electricity. The rest of the teachers are fine. The electricity teacher and math teacher are the best. The science teacher knows a lot but he don't know how to explain it. Overall the teachers are ok. I am passing everthing but Science VIP is hard, so is English VIP. Someone should tell the science teacher to explain more things and when we do an experiment tell what is going on.

Student 19.

The program is all right except for one or two things.

The first thing wrong with the program is that we have the wrong teacher for English. The English teacher we have is too hard. She wants every thing perfect. If things aren't done her way she doesn't want them done.

I like the program and all the teachers. The electric teacher is just great. The math teacher is an all around great sport and one of the best teachers there is. The science teacher is all right but doesn't know how to teach.

I like the program and am glad I am part of it.

Student 20.

I don't like this program because I don't understand Math, this program seem's to me, to deal with more math than any thing else. I like the idea of this program, because we should know a little about electricity. I like all of my VIP teachers, but I just don't like this course, because I am just not for it.

Student 21.

Well when I first got into the program I thought it was going to be hard, but if fine it to be all right. I like the program because we have some go teachers in this program. I think that any boy that is interested in electricity should take, if so they would enjoy this program. I have had a good time in the groups I have being in. I think all of my teacher have being more than fair to me. Although sometime they will make you mad, but I got over it. I would like to see more boys in this program because I think it would help a lot of them because I think it will help me into days world.

Student 22.

The VIP program is really ok adcept for a few things like some of our teachers they are something else. Like the English teacher for instant. Most of the thing we do in her class ain't even retaining to electricity like writing book reports and working in our English 2600 Edition, she is really something else. But oveall the other three is ok adcept the science teacher. I am a little unsure about him, he is a little bit funny in a way in showing us how to work something in his class. But then that is alright adcept the program ain't exactly like we were told it would be like and the thing that the teacher were going to do far us. But still it is a pretty nice program.

NOTE:

THESE COMMENTS ARE EXACT COPIES OF THOSE MADE BY THE STUDENTS. THE ONLY CHANGES WERE MADE WHEN A STUDENT LISTED A TEACHER BY NAME.

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CHESTERFIELD HIG

VOCATIONAL INTERDISCI

June, 1971

ELD HIGH SCHOOL

ERDISCIPLINARY PROGRAM

Demonstration Programs
of
Vocational Education
in
South Carolina Region V
BAVTE/DVTE Project No. 0-361-0006
Contract No. OEC-0-70-5190(361)

The Chesterfield High School

Vocational Interdisciplinary Program

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
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11th Grade

Team Members:

Dorothy S. Brewer - English

Luther C. Martin, Jr. - Mathematics

Jerry Daniel Hartley - Electronics

Stuart Thompson - Science

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General Obj
of
Vocational Interdisci
at
Chesterfield H

1. The student will show a gain in knowledge by scoring higher on
2. The student will demonstrate improved attitude toward school an
   demonstrate ability to accept responsibility, follow directions
3. Given common tools and equipment used in the electrical field,
   by correct and safe use of such tools and equipment.
4. The student will demonstrate that he understands the interrelat
   gained in one subject to solve problems in other subjects.

Other Objectives Are:

1. To provide fundamental learning upon which specialization can b
2. To motivate those students who have shown little interest in sc
3. To reduce drop-out rate.
4. To provide the student with the necessary skills for employment
   preparing the students to continue their education at the colle

General Objectives
of
Vocational Interdisciplinary Program
at
Chesterfield High School

n in knowledge by scoring higher on a post-test than did on a pre-test.

improved attitude toward school and community by improved attendance at school;

t responsibility, follow directions, and make decisions.

ment used in the electrical field, the student can demonstrate manipulative skills
uch tools and equipment.

that he understands the interrelationship of subject disciplines by using knowledge
ve problems in other subjects.

ing upon which specialization can be built.

ho have shown little interest in school and who are working below their ability.

the necessary skills for employment upon graduation, while at the same time
ntinue their education at the college level.

UNIT 1

ORIENTATION

LABORATORY

UNIT 1 ORIENTATION

OBJECTIVES:

1. To acquaint the student with the shop.
2. To introduce the student with some of the basic equipment.
3. The student will be able to use the basic electrical tools safely.
4. To familiarize the student with the possible job opportunities in the electricity-electronics field.

PRE-POST TEST

To be determined for lab.

Y	SCIENCE
	UNIT 1 ORIENTATION
shop. e of the basic he basic electrical he possible job electronics field.	OBJECTIVES: 1. The students will be able to demonstrate a knowledge of atomic theory. 2. The students will be able to demonstrate a knowledge of the concept of positively and negatively charged bodies. 3. The students will be able to demonstrate a knowledge of electrostatic attraction and repulsion.

MATHEMATICS

UNIT 1 ORIENTATION 6 Weeks

OBJECTIVES:

1. Given variables or numbers, the student will demonstrate the laws of communitivity, associativity, and distributivity.
2. Given fractions with like and unlike denominators, students will add, subtract, multiply, divide.
3. Given common fractions, the student will give the equivalent decimal form and vice versa.
4. Given resistors of variable ohms and variable tolerance, the student should give the upper and lower limit of the resistor.

PRE-POST TEST

1. Demonstrate the commutative property of integers.
2. What property is used here: $a(b + c) = ab + ac$?
3. a) Mult.: $(-\frac{1}{2}) \times (-4)$ b) $(3/3) \div (-1/3)$ divide
4. What is 22% of 64 ohms?
5. Express 2/5 as a decimal number.
6. Change .232 to a common fraction in simplest form
7. Compute 3.6% of 46.8.
8. What is the percent of tolerance in a 20 ohm resistor - 17 ohms - 23 ohms?

UNIT 1 ORI

OBJECTIVES

1. Pupils
can b
2. Pupils
3. Pupils
langu
4. Pupil
conce
5. Pupil
words

will demonstrate

y, and distributivity.

nominators, students

l give the equivalent

riable tolerance,

ower limit of

integers.

ab + ac?

) divide

plest form

20 ohm resistor -

COMMUNICATIONS

UNIT 1 ORIENTATION

OBJECTIVES:

1. Pupils will be able to prepare neat manuscripts that can be read easily.
2. Pupils will demonstrate ability by pre-tests.
3. Pupils will be able to communicate an idea using written language.
4. Pupils will be able to discuss some of the basic rules concerning the lab and the use of equipment.
5. Pupils will be able to spell and define technical words selected from this unit.

LABORATORY

CONTENTS

1. General safety rules.
2. Safety in use of the meters and hand tools.
3. Rules of the lab.
4. Jobs in the electrical field.
5. Jobs in the electronic field.
6. Jobs after completion of college.
7. Starting your own business.

RY	SCIENCE
hand tools.	**CONTENT** 1. The nature of matter 2. Molecules and atoms 3. Electrons, protons, and neutrons 4. Law of charges 5. Electrostatic attraction and repulsion
.	
4	

9. a) add: 2½ + 1¼ + 3/8 b) add: ¼ + 2 3/5 + (-1 3/10).

10. Subtract 2 1/3 from (-6 5/6).

11. Combine: (-½) - (+3/4) x (+2).

12. Combine: (-4.32) + (-.06) ÷ (+.002).

13. Subtract 36% of 400 from 52% of 650.

14. Compute .5% of 30.

15. Explain what is meant by 5 ± 10%.

CONTENT

1. Review integers.
2. Review operations with signed numbers.
3. Fractions
4. Decimals
5. Decimal - Fraction Conversions
6. Percentages

S	COMMUNICATIONS
3/5 + (-1 3/10).	CONTENT 1. Appearance and format of written work. 2. Spelling 3. Technical vocabulary 4. Discussions (class and group) 5. Selected technical readings and reports 6. Grammar and usage 7. Testing

LABORATORY

METHODOLOGY

1. Class discussions
2. Class hand-outs

STUDENT LEARNING ACTIVITIES

1. Reading hand-outs
2. Class discussions

POST TEST

R Y	SCIENCE
	METHODOLOGY 1. Lecture 2. Class discussion 3. Films STUDENT LEARNING ACTIVITIES 1. Class discussion 2. Films POST TEST

MATHEMATICS

METHODOLOGY

1. Numerous examples at the blackboard
2. Filmstrips
3. Filmloops

STUDENT LEARNING ACTIVITIES

1. Work examples at the blackboard.
2. Use of text.
3. Numerous examples for homework.

POST TEST

MEHTODOL

1. Clas
2. Pres
3. Expl
4. Test
5. Writ

STUDENT

1. Prov
2. Clas
3. Prov
4. Repo
   a.
   b.
5. Prov

POST TES

COMMUNICATIONS

MEHTODOLOGY

1. Class discussions
2. Presentation of new course concept
3. Explanations
4. Testing
5. Written assignments

STUDENT LEARNING ACTIVITIES

1. Provide list of technical words to be spelled
2. Class discussions
3. Provide selected readings
4. Reports
    a. Oral
    b. Written
5. Provide reading periods

POST TEST

UNIT 2

HAND TOOLS AND SOLDERING

LABORATORY

UNIT 2 HAND TOOLS AND SOLDERING

OBJECTIVES:

1. The student will be able to use the basic hand tools used in electricity - electronics.
2. The students will be able to choose the correct type of solder and apply it correctly.
3. The students will be able to choose the proper instrument for soldering a joint and the solder for that joint.

PRE-POST TEST

A physical type test in which the student is required to solder some simple joints and do some simple wiring with the hand tools.

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S C I E N C E

UNIT 2 HAND TOOLS AND SOLDERING

OBJECTIVES:

1. The students will be able to demonstrate a proficiency in the use of Ohm's Law.
2. The students will be able to calculate the combined resistance of resistors in parallel.
3. The students will be able to calculate the combined resistance of resistors in series.

PRE-POST TEST

M A T H E M A T I C S

UNIT 2 HAND TOOLS AND SOLDERING 3-4 Weeks

OBJECTIVES:

1. The student will be able to identify and manipulate basic symbols of algebra and electricity.
2. The student will be able to solve simple algebraic equations with one unknown.

PRE-POST TEST

1. What is a variable?
2. Solve for x: $2x + 4 = 12$
3. Convert the formula $A=lw$ so that you are solving for l.
4. Convert $A = 2l + 2w$ so that you are solving for w.
5. Explain why you can not answer as true or false: $2x > 6$.
6. What is the equation known as Ohm's Law?
7. Give the mathematics symbol for "not equal to".

UNIT 2 HAND

OBJECTIVES:

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UNIT 2 HAND TOOLS AND SOLDERING

OBJECTIVES:

1. Given technical and non-technical words selected from this unit, pupils will be able to spell and define them.
2. Pupils will be able to make reports on the basic hand tools used in electricity - electronics.
3. Pupils will be able to use good grammar and form in written reports on the different types of meters.
4. Pupils will be able to use vocabulary of Ohm's Law.

PRE-POST TEST

LABORATORY

CONTENT

The use of:

1. Basic hand tools
    a. Pliers
    b. Screwdriver
    c. Cutters
    d. Soldering irons
    e. Solder
    f. Strippers
2. Splices
    a. T
    b. Rat-tail
    c. Western Union
3. Drills
    a. Wood

SCIENCE

CONTENT

1. Ohm's Law
2. Parallel circuits
3. Series circuits
4. Combined circuits

M A T H E M A T I C S

8. Solve for x: $3x - 2 = 2x + 12$.

9. Solve for R: $E=IR$ where $E = 30$, $I = 5$.

10. True or false: $\frac{1}{2}x + 4 = \frac{x+4}{2}$

11. Solve for y: $x/2 + y/3 = 8$ where $x = 10$.

12. Give the Greek symbol for "alpha".

CONTENT

1. Symbols -Mathematical and Electrical
2. Solving basic algebraic equations
3. Ohm's Law.
4. Conversion of formulas

CONTENT

1. Techni
2. Spelli
3. Gramma
4. Scient
5. Techni
6. Report

S	COMMUNICATIONS
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	CONTENT 1. Technical and non-technical vocabulary 2. Spelling (Emphasis in all written assignments) 3. Grammar and usage 4. Scientific reports on related scientific reading 5. Technical research 6. Reports on interest areas of lab work.

   b. Metal

4. Conduit bender

METHODOLOGY

1. Demonstrations
2. Class discussions
3. Class practice with actual equipment

STUDENT LEARNING ACTIVITIES

1. Class discussions
2. Project using hand tools resulting in the use of the meters for testing this project. (ex. Hooking up a simple circuit and measuring the voltage, current, etc. associated with this project.)

POST TEST

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SCIENCE

MEHTODOLOGY

1. Lecture
2. Discussions
3. Handouts

STUDENT LEARNING ACTIVITIES

1. Class discussions.
2. Solving problems.

POST TEST

MATHEMATICS

METHODOLOGY

1. Blackboard
2. Filmstrips
3. Filmloops
4. Transparencies

STUDENT LEARNING ACTIVITIES

1. Working examples at blackboard
2. Research on Greek alphabet
3. Text
4. Homework

POST TEST

METHODOLOGY

1. Discussio
2. Reports
   a. Oral
   b. Writte
3. Tests
4. Assignmen

STUDENT LEARN

1. Provide p
   to meters
2. Discussio
3. Reports -
4. Provide r

POST TEST

TICS

COMMUNICATIONS

METHODOLOGY

1. Discussions
2. Reports
    a. Oral
    b. Written
3. Tests
4. Assignments

STUDENT LEARNING ACTIVITIES

1. Provide pupils with vocabulary list relating to meters and hand tools.
2. Discussions
3. Reports - Oral and Written
4. Provide reading periods

POST TEST

UNIT 3

MEASUREMENT OF ELECTRICITY

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LABORATORY

UNIT 3 MEASUREMENT OF ELECTRICITY

OBJECTIVES:

The student will be able to choose the correct meter to measure a given quantity and will be able to apply it correctly.

PRE-POST TEST

Various electrical measurements with the multimeter.

UNIT 3 MEA

OBJECTIVES

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UNIT 3 MEASUREMENT OF ELECTRICITY

OBJECTIVES:

1. The students will be able to demonstrate a knowledge of how voltmeters, galvanometers, ampmeters and ohmmeters are constructed.
2. The students will be able to calculate the resistance and how connected to convert a galvanometer into a voltmeter or ammeter of the required size.

PRE-POST TEST

MATHEMATICS

UNIT 3 MEASUREMENT OF ELECTRICITY (Meter Reading)

OBJECTIVES:

1. The student will understand the basic metric units and will relate the metric system to scientific notation.
2. Given scientific notation and a slide rule the student will multiply, divide, $\sqrt{}$, $\sqrt[3]{}$.

PRE-POST TEST

1. What does "milli" mean in fraction form?

UNIT 3

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UNIT 3 MEASUREMENT OF ELECTRICITY

OBJECTIVES:

1. Pupils will demonstrate improved knowledge of the history of measurement by answering oral and written questions.
2. Pupils will be able to make reports on related scientific reading with emphasis on men who have contributed to the development of electricity.
3. Pupils will be able to recognize, use, and write Greek alphabets and symbols used in electricity and Math.
4. Pupils will be able to spell and define words selected from this unit.
5. Pupils will demonstrate knowledge of Latin and Greek prefixes and roots in vocabulary study.
6. Pupils will show improvement in reading comprehension.

PRE-POST TEST

L A B O R A T O R Y

CONTENT

1. Measurements with the voltmeter
2. Measurements with the ampmeter
3. Measurements with the milliampmeter
4. Measurements with the Ohmmeter
5. Measurements with the power meter.
6. Measurements with the multimeter.

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ter r. .	CONTENT 1. Theory of voltmeter 2. Theory of ohmmeter 3. Theory of ampmeter

MATHEMATICS

2. Which is larger, 500 meters or 2 kilometers?
3. Use scientific notation to multiply 3 millimeters times 2 centimeters.
4. Convert 25 meters to hectometers.
5. Write in decimal form: 3.6×10^{-2}.
6. Write in scientific notation: .00000834.
7. Use your slide rule to calculate 38200 x .226.
8. Use your slide rule to calculate $\sqrt[3]{828}$.
9. Approximately how tall are you in decimeters?
10. Use your slide rule to calculate

$\sqrt{834} \times (2.6 \times 10^5)$.

CONTENT

1. Metric system
2. Scientific notation
3. Basic slide rule - multiplication, division, square and cube root.

CONTENT

1. Spellin
   a. Lati
   b. Gre
   c. Tec
2. Grammar
3. Technic
   electri
4. Writing

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COMMUNICATIONS

CONTENT

1. Spelling and vocabulary
    a. Latin and Greek prefixes
    b. Greek alphabets and symbols
    c. Technical words
2. Grammar and Usage
3. Technical written reports on measurements of electricity.
4. Writing up experiments

LABORATORY

METHODOLOGY

1. Class demonstrations on the actual items listed and with demonstration equipment.
2. Class lectures

STUDENT LEARNING ACTIVITIES

1. Actual work experience on the various electrical equipment using the multimeter
2. Class discussions
3. Class lectures

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METHODOLOGY

1. Lecture
2. Handouts
3. Discussions

STUDENT LEARNING ACTIVITIES

1. Discussions
2. Drawing and labeling meter circuits.
3. Problem solving

MATHEMATICS

MEHTODOLOGY

1. Examples at blackboard
2. Meter stick
3. Demonstrate slide rule
4. Filmloops

STUDENT LEARNING ACTIVITIES

1. Use of text
2. Operation of slide rule
3. Use of meter stick
4. Homework

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5. Scientific readings

6. Improving reading comprehension

   a. Finding central thought

   b. Spotting important specific details

   c. Guessing at meaning of words from context.

METHODOLOGY

1. Teacher led discussions

2. Filmstrips

3. Class discussions

4. Testing

5. Written and oral reports

6. Reading to find central thought, to spot specific details, and to guess at word meaning through context.

STUDENT LEARNING ACTIVITIES

1. Provide pupils with list of Greek alphabets, symbols, prefixes and roots to be learned.

2. Have pupils to read selected passages to find central thought, spot specific details, and to guess at word meaning.

3. Have pupils to do scientific research.

LABORATORY

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MATHEMATICS	
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POST TEST	POST TEST

	COMMUNICATIONS
	4. Allow pupils to use occasionally part of period for reading magazines and newspapers. 5. Provide discussion periods POST TEST

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UNIT 4

SOURCES OF ELECTRICITY

LABORATORY

UNIT 4 SOURCES OF ELECTRICITY

OBJECTIVES:

The students will be able to identify the various methods for producing electricity and will be able to explain how they can be practically utilized

PRE-POST TEST

1. Name five sources of electricity.
2. How do these sources produce electricity?
3. How many of the above are used commercially? How?
4. If not used commercially explain your idea on how they could be.

UNIT 4 SOURCE

OBJECTIVES:

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	UNIT 4 SOURCES OF ELECTRICITY
the various methods able to explain icity? hr	**OBJECTIVES:** 1. The students will be able to demonstrate a knowledge of the different sources of electricity. 2. The students will be able to demonstrate a knowledge of the theory of the different sources. **PRE-POST TEST**

MATHEMATICS

UNIT 4 SOURCES OF ELECTRICITY

OBJECTIVES:

1. Students shall demonstrate a knowledge of complex fractions by combining portions of the type $\frac{\frac{1}{x}}{\frac{1}{y}}$ through +, −, x, ÷.
2. The students shall graph, on an x-y plane, linear equation (AX + BY = C).
3. The student will demonstrate a knowledge of the laws of exponents by combinations of bases other than 10 (scientific notation).

PRE-POST TEST

1. Simplify: a. $\frac{2}{\frac{1}{2}}$ b. $\frac{2\frac{1}{2}}{4\ 1/3}$ c. $\frac{.25}{\frac{1}{4}}$
2. Add: $\frac{1\ 1/3}{1\ 1/8} + \frac{1}{3}$
3. State the general QUADRATIC EQUATION.
4. Without solving, what is the sum of the roots of $5x^2 + 3x - 6 = 0$? $-\frac{b}{a}$
5. State the quadratic formula.
6. Solve by any method:
   $\frac{2}{3x}{}^2 + 2x - \frac{1}{2} = 0.$

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	C O M M U N I C A T I O N S
	UNIT 4 SOURCES OF ELECTRICITY
complex e $\frac{\frac{1}{x}}{\frac{1}{y}}$ linear f the laws r than roots of	**OBJECTIVES:** Pupils will be able to: 1. Give oral and written reports on technical subjects and on related historical material concerning men who have contributed to the the development of electricity. 2. Write up experiments in good form. 3. Spell and define scientific words relating to this unit. PRE-POST TEST

LABORATORY

CONTENT

1. Batteries
2. Solar cells
3. Generators (alternators)
4. Thermocouple
5. Crystals
6. Practical utilization of each of the above.

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he above.	**CONTENT** 1. Batteries 2. Solar cells 3. Generators (alternators) 4. Thermocouple 5. Crystals

MATHEMATICS

7. Simplify $\sqrt[3]{\frac{27x^2}{8y^3}}$

8. When multiplying powers with like bases the exponents are__________.

9. Divide: $\frac{5^3 x^2 y^9}{25xy^2 z^3}$

10. Multiply: $3^{-2} x^4 \times 3^4 x^2 y^{-3}$.

CONTENT

1. Complex fractions
2. Quadratic equations and square roots
3, Powers - laws of exponents

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COMMUNICATIONS

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CONTENT

1. Spelling
2. Technical vocabulary
3. Scientific readings
4. Reporting
    a. Oral
    b. Written
5. Grammar and usage for technical writings
6. Library reference materials
7. Other sources

LABORATORY

METHODOLOGY

1. Class demonstrations of each type of source These demonstrations will come from equipment in which each source is used.
2. Class discussions.

STUDENT LEARNING ACTIVITIES

1. Class demonstrations
2. Class discussions
3. Reading assignments
4. Class experiments

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source equipment	**METHODOLOGY** 1. Lecture 2. Class discussions 3. Films 4. Reports 5. Demonstrations 6. Experiments **STUDENT LEARNING ACTIVITIES** 1. Class discussions 2. Handouts 3. Reports 4. Experiments **POST TEST**

M A T H E M A T I C S

METHODOLOGY

1. Blackboard
2. Filmstrips

STUDENT LEARNING ACTIVITIES

1. Let student work at the blackboard.
2. Let students help each other as class work.
3. Use of text.
4. Homework.

POST TEST

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COMMUNICATIONS

METHODOLOGY

1. Discussions
2. Filmstrips
3. Tests
4. Reports (Oral and Written)

STUDENT LEARNING ACTIVITIES

ass

1. Provide pupils with vocabulary list
2. Look up material on men who have contributed to the development of electricity
3. Make reports
4. Discussions
5. Read articles concerning electricity from newspapers
6. Group projects
7. Provide reading periods

POST TEST

UNIT 5

MAGNETISM

LABORATORY

UNIT 5 MAGNETISM

OBJECTIVES:

The students will be able to construct both an electromagnet and a permanent magnet and will be able to show where each one of these are practically used.

PRE-POST TEST

1. Explain how magnetism relates to electron flow with reference to the alternator.
2. What determines the magnetic flux in an electromagnet?
3. Explain how electromagnets are used in such things as bells and buzzers.
4. How does an alternator differ from a generator?
5. Explain how a P.M. motor works.

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UNIT 5 MAGNETISM

OBJECTIVES:

1. The students will be able to demonstrate a familiarity with magnetic theory.
2. The students will be able to solve problems dealing with magnetism.

PRE-POST TEST

M A T H E M A T I C S

UNIT 5 MAGNETISM

OBJECTIVES:

1. The student will define ratio and proportion as related to fractions and equal fractions.
2. Given ratio and proportion, the student will solve simple equations and basic formulas.
3. Given a proportion, the student will demonstrate a knowledge of terms and their cross products.

PRE-POST TEST

1. Define ratio.
2. What are the 1st and 4th terms in a proportion called?
3. Using the proportion $\frac{a}{b} = \frac{c}{d}$, illustrate what is meant by "the product of the means equals the product of the extremes".
4. True or false: $\frac{a}{b} = \frac{c}{d} \rightarrow \frac{a}{c} = \frac{b}{d}$?
5. What is the formula to find the volume of a cube?

UNIT 5

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C O M M U N I C A T I O N S

UNIT 5 MAGNETISM

OBJECTIVES:

1. Pupils will be able to discuss the basic principles of magnetism in speech and writing.
2. Pupils will demonstrate improved knowledge of paragraphing by writing well-developed paragraphs.
3. Pupils will be able to construct complete sentences using good grammar, punctuation, and usage.
4. Given a list of words selected from this Unit, pupils will be able to spell and define them.

PRE-POST TEST

LABORATORY

CONTENT

1. Construction of electromagnet
2. Construction of permanent magnet
3. Simple P.M. and electromagnets.
4. P. M. motors (D.C.).
5. A.C. motors
6. Bells, buzzers and other similar electromagnetic operated devices.
7. Generators
8. Alternators

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SCIENCE

CONTENT

1. Laws of magnetism.
2. Electron flow and magnetism.
3. Magnetic flux.

M A T H E M A T I C S

6. Find the volume of a cylinder whose height is 6" and whose base has a radius of 2".

7. Solve for x and y = $2x = 3y - 4$
$y + 6x = 4y + x - 8$

8. Explain why $x = \frac{2}{5}$ can be classified as a proportion.

9. Solve by product of extremes and means =
$\frac{R}{2} = \frac{E}{I}$ where $E = 110$ and $I = 20$.

10. Simplify this ratio: $\frac{26xy}{13xy}$.

CONTENT

1. Ratio and Proportion
2. Further study in equations and formulas with an introduction to simultaneous equations.

CONTENT

1. Discussions
2. Grammar an
3. Oral and W
4. Spelling vo
5. Laws of ma
6. Sentence st
7. Scientific
8. Experiment

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C O M M U N I C A T I O N S

CONTENT

1. Discussions of projects and experiments
2. Grammar and Usage for technical writings
3. Oral and Written reports
4. Spelling vocabulary
5. Laws of magnetism
6. Sentence structure and paragraphing
7. Scientific readings
8. Experiment reports

LABORATORY

METHODOLOGY

1. Construction of an experimentation with:
   - a. Electromagnet
   - b. Bell
   - c. D.C. motor
   - d. D.C. generator
2. Class discussions
3. Reading assignments

STUDENT LEARNING ACTIVITIES

1. Construction of buzzer (individual)
2. Group construction of
   - a. D.C. motor
   - b. D. C. generator
3. Class discussion
4. Reading assignments

POST TEST

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	METHODOLOGY
tion with:	1. Lecture
	2. Discussion
	3. Demonstrations
	4. Handouts
	STUDENT LEARNING ACTIVITIES
dual)	1. Class discussions
	2. Handouts
	3. Reading assignments
	4. Problem solving
	POST TEST

MATHEMATICS	
METHODOLOGY 1. Use of blackboard 2. Filmstrips	METHODOLOGY 1. Oral and Wri 2. Discussions 3. Filmstrips
STUDENT LEARNING ACTIVITIES 1. Solving problems at the blackboard 2. Use of text 3. Numerous examples for homework	STUDENT LEARNIN 1. Study, discu paragraphs 2. Find topic and name su 3. Read articl to magnetis 4. Provide lis 5. Provide rea
POST TEST	POST TEST

COMMUNICATIONS

METHODOLOGY

1. Oral and Written reports
2. Discussions
3. Filmstrips

STUDENT LEARNING ACTIVITIES

1. Study, discuss, develop, and organize technical paragraphs
2. Find topic sentence in technical writing and name supporting details
3. Read articles from magazines and newspapers relating to magnetism and make reports in class
4. Provide list of words selected from this unit
5. Provide reading periods

POST TEST

UNIT 6

TRANSFORMERS

LABORATORY

UNIT 6 TRANSFORMERS

OBJECTIVES:

To give the students a basic understanding of transformer action so that they will be able to hook up any basic type of transformer.

PRE-POST TEST

1. What is a step-up transformer?
2. What is a step-down transformer?
3. Explain Pin = Pout
4. What is the difference between a simple, dual, and three phase transformer?
5. What is the actual purpose of a transformer?

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SCIENCE

UNIT 6 TRANSFORMERS

OBJECTIVES:

1. The students will be able to demonstrate a knowledge of the theory of transformer operation.
2. The students will be able to solve problems dealing with transformers.

PRE-POST TEST

MATHEMATICS

UNIT 6 TRANSFORMERS

OBJECTIVES:

1. Given basic power formulas, the student will demonstrate a basic understanding of algebra by substituting and transposing to derive new formulas.
2. Given formulas and values, the student will solve for unknowns such as voltage, current, power.
3. The student will demonstrate a knowledge of graphs through definitions and actual graphing linear equations.

PRE-POST TEST

1. a. What is the degree of a linear equation?
   b. What is the degree of a quadratic equation?
2. Define parabola.
3. Without graphing, give the ordered pair of the vertex of the parabola $y = (x - 2)^2 + 3$.

UNIT 6 TRANSFO

OBJECTIVES:

1. Pupils wil
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2. Pupils wil
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3. Pupils wil
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4. Pupils wil
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PRE-POST TEST

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COMMUNICATIONS

UNIT 6 TRANSFORMERS

OBJECTIVES:

1. Pupils will be able to discuss the basic principles of transformer action and hook-up in writing and speech.
2. Pupils will be able to spell and define technical words selected from this unit.
3. Pupils will demonstrate ability to use good grammar, good usage, and to punctuate in all written work.
4. Pupils will be able to:
    a. Write letters of application
    b. Fill out job application blanks
    c. Conduct themselves confidently in an interview.

PRE-POST TEST

LABORATORY

CONTENT

1. Purpose of transformers
2. Step-up transformers
3. Step-down transformers
4. Polyphase transformers
5. Transformer hook-up

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ATORY	SCIENCE
	CONTENT 1. Inductance 2. Step-up transformers 3. Step-down transformers

4. Is the vertex of this parabola a maximum or minimum point: $y = -\frac{1}{2}(x + 9)^2 - 1/3$?
5. State the equation of a circle with radius r and center (h, k).
6. Graph the equation whose center is (-9, -3) and whose radius is ½.
7. Find the radius of the circle whose center is (0,0) and that contains the point (1,3).
8. Give the ordered pair of the center of the circle with the equation $x^2 + y^2 = 25$.

CONTENT

1. Power Formulas
   a. $P = VI$
   b. $P = I^2R$
   c. $P = \frac{V^2}{R}$
   d. $P = VI \cos \theta$
2. Graphs
   a. x - y axis
   b. linear equations

CONTENT

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COMMUNICATIONS

CONTENT

1. Spelling and vocabulary
2. Grammar and usage
3. Technical readings
4. Job interviews
5. Application blanks
6. Experiment reports
7. Technical reports
8. Letter writing (Letter of Application)

L A B O R A T O R Y

METHODOLOGY

1. Class lectures
2. Class discussions
3. Field trip to a sub-station

STUDENT LEARNING ACTIVITIES

1. Class lectures
2. Class discussions
3. Field trip
4. Reading assignments
5. Individual construction of transformers
6. Transformer Hook-ups

POST TEST

SCIENCE

METHODOLOGY

1. Lecture
2. Class discussion
3. Films
4. Demonstrations
5. Handouts

STUDENT LEARNING ACTIVITIES

1. Class discussion
2. Solving handout problems
3. Reading assignments

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POST TEST

MATHEMATICS

METHODOLOGY

1. Blackboard
2. Transparencies
3. Filmstrips

STUDENT LEARNING ACTIVITIES

1. Work problems at blackboard
2. Use of text
3. Homework

POST TEST

METHODOLOGY

1. Discussio
2. Spelling
3. Filmstri
4. Letter wr
5. Job inter
6. Oral and

STUDENT LEARN

1. Make oral assignmen
2. Write let
3. Write che slips
4. Prepare a informati
5. Have int

POST TEST

COMMUNICATIONS

METHODOLOGY

1. Discussions
2. Spelling and vocabulary study
3. Filmstrips
4. Letter writing (Letter of Application)
5. Job interviews
6. Oral and written reports

STUDENT LEARNING ACTIVITIES

1. Make oral and written reports on technical assignments.
2. Write letters of application
3. Write checks, balance stubs, and make out deposit slips
4. Prepare application forms including pertinent information
5. Have interviews

POST TEST

UNIT 7

ELECTRICAL CIRCUITS

L A B O R A T O R Y

UNIT 7 ELECTRICAL CIRCUITS

OBJECTIVES:

To give the student a basic understanding of commercial wiring techniques so that he will be able to do simple wiring jobs.

PRE-POST TEST

Observation of wiring techniques with emphasis on safety and neatness.

UNIT 7 EL

OBJECTIVES

1. The s
   a kno
2. The s
   power
   Ohm's
   in or

PRE-POST

RY	SCIENCE
	UNIT 7 ELECTRICAL CIRCUITS
tanding that he will be with	OBJECTIVES: 1. The students will be able to demonstrate a knowledge of the concepts of power and energy. 2. The students will be able to use the concepts of power and energy along with the concepts of Ohm's Laws and series and parallel circuits in order to solve problems. PRE-POST TEST

MATHEMATICS

OBJECTIVES:

1. Given sine, cosine, and tangent functions, the student will demonstrate a basic understanding of trigonometry by problem solving.
2. Given graph paper, the student will graph the sine function.
3. Since the valve of π is now being used, the student will demonstrate his knowledge of circles by definitions and formulas.

PRE-POST TEST

1. Using your tables, what is the tangent of 48°?
2. Find the radius of a circle with an area of 130 sq. in.
3. If a 30' ladder was placed against a building so that the base of the ladder was 12' from the base of the building, what angle would be formed by the ladder and the ground?
4. What angle would be formed by a 20' pole and a rope attached to the top of the pole if the rope touched the ground 15'

OBJECTIVE

Pupils sh

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4. Sp

PRE-POST

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a building so

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pole

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COMMUNICATIONS

OBJECTIVES:

Pupils should be able to:

1. Write clear, coherent reports on electrical circuits and commerical wiring with emphasis on safety and neatness.
2. Give clear oral explanations of electrical circuits and commerical wiring using diagrams.
3. Make technical reports on all projects.
4. Spell technical words selected from this unit.

PRE-POST TEST

LABORATORY

CONTENT

Wiring of bells, motors, generators, lights, and other electrical apparatus that is commonly found in homes and industries

METHODOLOGY

1. Supervision and inspection of each student's wiring ability with help to the individual

that

ies

udent's

vidual

SCIENCE

CONTENT

1. Power
2. Energy
3. Review of Ohm's Law, parallel circuits, and series circuits.

METHODOLOGY

1. Lecture
2. Class discussion

MATHEMATICS

from the base of the pole?

5. Briefly explain how you could determine the value of π if you knew the radius and the circumference of a circle.
6. Sketch the sine wave locating 10 points accurately by using your table.
7. Explain why the tangent of 90° is indeterminate.

CONTENT

1. Basic right triangular trigonometry
    a. Sine
    b. Cosine
    c. Tangent
    d. Pythagoean Theorem
2. Graphing the sine wave
3. Circle

METHODOLOGY

1. Boardwork
2. Filmstrips

CONTENT

1. Technical voca
2. Experiment re
3. Technical repo
4. Critiques
5. Technical rea
    a. Read
    b. Discuss
    c. Write
6. Grammar and u

METHODOLOGY

1. Teacher led d
2. Reports

C S

ermine

adius

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points

indeterminate.

ry

COMMUNICATIONS

CONTENT

1. Technical vocabulary
2. Experiment reports
3. Technical reports (on projects)
4. Critiques
5. Technical readings
    a. Read
    b. Discuss
    c. Write
6. Grammar and usage

METHODOLOGY

1. Teacher led discussions
2. Reports

LABORATORY

student.

2. Class discussions.

3. Class wiring practices

STUDENT LEARNING ACTIVITIES

1. Hopefully here the students can take numerous field trips where they can actually wire electrical apparatus under the supervision of the instructor.

2. Class discussion.

POST TEST

3. Dem

4. Har

STUDENT

1. Cla

2. Sol

3. Fil

POST T

ORY	SCIENCE
	3. Demonstrations 4. Handouts
take can tus structor.	STUDENT LEARNING ACTIVITIES 1. Class discussion 2. Solving problems 3. Films
	POST TEST

MATHEMATICS

3. Filmloops

STUDENT LEARNING ACTIVITIES

1. Actual measuring of sides and angles of triangles to insure correct calculations.
2. Classwork - boardwork.
3. Homework.

POST TEST

a. Oral

b. Writte

3. Provide pu

4. Explanatio

STUDENT LEARNI

1. Vocabulary

2. Filmstrips,

projector

3. Reading wil

newspapers,

4. The use of

5. Occasionall

to read an

POST TEST

C S

s of

tions.

C O M M U N I C A T I O N S

   a. Oral

   b. Written

3. Provide pupils with vocabulary and spelling list.
4. Explanations

STUDENT LEARNING ACTIVITIES

1. Vocabulary study will be constant.
2. Filmstrips, transparencies, and overhead projector will be used.
3. Reading will be encouraged. (books, magazines, newspapers, etc.)
4. The use of the library will be encouraged.
5. Occasionally, pupils will be taken to library to read and do research.

POST TEST

UNIT 8

COMMERCIAL ELECTRICAL APPARATUS AND SUPPLIES

LABORATORY

UNIT 8 COMMERCIAL ELECTRICAL APPARATUS AND SUPPLIES

OBJECTIVES:

To cover the various pieces of electrical apparatus and their approximate cost. To give the student an understanding where and how to buy electrical equipment.

After this unit the student will be able to pick the best materials for a certain job and will know their approximate cost.

PRE-POST TEST

1. What are the basic types of switch boxes and where are these used?
2. What controls other than switches are used on motors?
3. Where are the cheapest places to obtain electrical equipment?

UNIT 8 C

OBJECTIVE

1. The s
under
and u

PRE-POST

Y	SCIENCE
AND SUPPLIES	UNIT 8 COMMERCIAL ELECTRICAL APPARATUS AND SUPPLIES
ctrical To give how to buy e able in job and n are obtain	OBJECTIVES: 1. The students will be able to demonstrate an understanding of the theory behind the operation and use of common electrical apparatus and supplies. PRE-POST TEST

MATHEMATICS

UNIT 8 COMMERCIAL ELECTRICAL APPARATUS AND SUPPLIES

OBJECTIVES:

To insure the students understanding of graphing and the use of graphing as a means for solving equations.

1. Now that the student has the basic knowledge of graphs introduced in the preceding units, he shall demonstrate deeper knowledge by solving equations using the graph.

PRE-POST TEST

1. Determine the equation for the line containing the points (2,4) and (-1, -2).
2. What is the slope of the above line?
3. Graph the above line.
4. State the formula for the distance between two points.

UNIT 8 COMMERCIA

OBJECTIVES:

1. Given certai
pupils will
correct form
2. Pupils will
practical ap
cations.
3. Pupils will
to direction
4. Pupils will
discussed in

PRE-POST TEST

SUPPLIES

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ween

COMMUNICATIONS

UNIT 8 COMMERCIAL ELECTRICAL APPARATUS AND SUPPLIES

OBJECTIVES:

1. Given certain electrical equipment to order, pupils will be able to write a letter using correct form.
2. Pupils will demonstrate proficiency in practical applications of oral and written communications.
3. Pupils will be able to listen actively and critically to directions and explanations.
4. Pupils will be able to spell technical words discussed in this unit.

PRE-POST TEST

L A B O R A T O R Y

4. Name the major brands of cable used in the U. S.
5. How is the electrical code related to electrical supplies?

CONTENT

1. Electrical supplies
2. Types of equipment
3. Motor control
4. Brand names
5. Electrical code
6. Cables and wires

CONTEN

1. Mc
2. Th
   wi

SCIENCE

CONTENT

1. Motor theory
2. Theory of why different lengths and diameter wire is used in different applications.

MATHEMATICS

5. Give the ordered pair for the midpoint of the line segment having endpoints (2,6) and (5,3).
6. Graph: $y = 2x + 3$ and $2x + 4y - 12 = 0$ and estimate the common values of x and y.
7. Solve the above simultaneous equations algebraically to check your answer in #6.
8. What is a Cartesian plane?

CONTENT

1. Deeper study of Cartesian plane and linear equations.
2. Formula for the distance between two points.
3. Midpoint formula.
4. Review of simultaneous equations.

CONTENT

1. Let
   a.
   b.
2. Gra
3. Spe
4. Voc
5. Lis
6. Ora
7. Lab

TICS

dpoint of

s (2,6) and (5,3).

12 = 0 and

and y.

ations alge-

n #6.

and linear equations.

two points.

.

COMMUNICATIONS

CONTENT

1. Letter writing
    a. Order letters
    b. Letters requesting information and catalogues
2. Grammar and usage
3. Spelling
4. Vocabulary
5. Listening and communication skills
6. Oral reports on technical readings
7. Laboratory progress reports

L A B O R A T O R Y

METHODOLOGY

1. Lectures
2. Class discussion
3. Demonstration

STUDENT LEARNING ACTIVITIES

1. Class room discussion
2. Reading assignments
3. Field trips

POST TEST

METHODOLOGY

1. Lecture
2. Class di
3. Demonstr
4. Handouts

STUDENT LEAR

1. Class di
2. Working
3. Reading

POST TEST

ATORY	SCIENCE
	METHODOLOGY 1. Lecture 2. Class discussion 3. Demonstrations 4. Handouts **STUDENT LEARNING ACTIVITIES** 1. Class discussion 2. Working handout sheets 3. Reading assignments **POST TEST**

MATHEMATICS

METHODOLOGY

1. Examples at blackboard (Cartesian Plane)
2. Filmstrips
3. Transparencies.

STUDENT LEARNING ACTIVITIES

1. Classwork - desk and blackboard
2. Use of text
3. Homework

POST TEST

C

METHODOLOGY

1. Discussions
2. Reports

STUDENT LEARNING ACT

1. Lab reports writ
2. Spelling list of
3. Discussions on w
4. Progress reports
5. Letter writing

POST TEST

COMMUNICATIONS

METHODOLOGY

1. Discussions
2. Reports

STUDENT LEARNING ACTIVITIES

1. Lab reports written
2. Spelling list of technical words provided.
3. Discussions on work done in laboratory.
4. Progress reports of activities in lab.
5. Letter writing

POST TEST

UNIT 9

INTRODUCTION TO BASIC ELECTRONIC COMPONENTS

LABORATORY

UNIT 9 INTRODUCTION TO BASIC ELECTRONIC COMPONENTS

OBJECTIVES:

To give the student a basic understanding of electronic components and their use so that they will be able to build simple electronic devices.

PRE-POST TEST

1. What is the function of:
    1) Resistor
    2) Capacitor
    3) Vacuum tube
    4) Transistor
    5) Coil
    6) Diode
2. Where would each of the above be found?
3. What does each of the above do to an AC signal? To a DC signal?
4. What is the unit associated with each

UNIT 9 INTRODU

OBJECTIVES:

1. The studen
knowledge
vacuum tub

PRE-POST TEST

ITS

at they

ces.

S C I E N C E

UNIT 9 INTRODUCTION TO BASIC ELECTRONIC COMPONENTS

OBJECTIVES:

1. The students will be able to demonstrate a knowledge of the theory of capacitors, resistors, vacuum tubes, transistors, diodes and coils.

PRE-POST TEST

MATHEMATICS

UNIT 9 INTRODUCTION TO BASIC ELECTRONIC COMPONENTS

OBJECTIVES:

1. The student will demonstrate knowledge in using logarithmic tables.
2. Given log tables, the student will solve fairly complex problems using products and quotients of radicals and powers.

PRE-POST TEST

1. What is a logarithmic function?
2. $b^{\log -x}$ = ______.
3. Complete the theorem: $\log_b a^c$ = ____________.
4. Write in exponential form: $\log_{\frac{1}{2}} 8 = -3$.
5. Write in logarithmic form: $81 = 3^4$.
6. True or false: $\log_2 8 - \log_{\frac{1}{2}} 8 = 6$
7. Evaluate: $\log_{10} 1140$.
8. Evaluate: $\text{antilog}_{10}\ 0.8401$.
9. In logarithms, what is the purpose of the characteristic?
10. Evaluate: $\log_5 927$.

UNIT 9 INTRO

OBJECTIVES:

PRE-POST TES

	COMMUNICATIONS
ENTS	UNIT 9 INTRODUCTION TO BASIC ELECTRONIC COMPONENTS
	OBJECTIVES:
using	
	PRE-POST TEST
______.	

L A B O R A T O R Y

of them? (Ex: coil - Henry)

5. Draw the symbol for each.

CONTENT

1. Resistors
2. Capacitors
3. Vacuum tubes
4. Transistors
5. Coils
6. Diodes
7. Symbols

METHODOLOGY

1. Lectures
2. Demonstration
3. Student projects

STUDENT LEARNING ACTIVITIES

1. Lectures
2. Demonstration
3. Reading assignments
4. Experimentation with components

CONTENT

1. Resist
2. Capaci
3. Vacuum
4. Trans
5. Coils
6. Diode
7. Symbo

METHODOLO

1. Lectu
2. Class
3. Demon

STUDENT L

1. Class
2. Repor

Y

SCIENCE

CONTENT

1. Resistors
2. Capacitors
3. Vacuum tubes
4. Transistors
5. Coils
6. Diodes
7. Symbols

METHODOLOGY

1. Lecture
2. Class discussion
3. Demonstrations

STUDENT LEARNING ACTIVITIES

1. Class discussions
2. Reports

MATHEMATICS

CONTENT

1. Polynomial Functions
    a. Review linear equations
    b. Review basic quadratic equations
    c. Parabola
    d. Circle

1. Logarithms
    a. mantissa
    b. characteristic
2. Converting from expeverted form to log form
3. Basic laws of logs.
4. Use of log tables

METHODOLOGY

1. Blackboard
2. Filmstrips
3. Demonstrating graphs

STUDENT LEARNING ACTIVITIES

1. Solving equations at blackboard
2. Graphing at board
3. Homework

C

CONTENT

METHODOLOGY

STUDENT LEARNING ACT

C S	COMMUNICATIONS
Logarithms a. mantissa b. characteristic Converting from expeverted form to log form Basic laws of logs. Use of log tables	CONTENT METHODOLOGY STUDENT LEARNING ACTIVITIES

LABORATORY	
POST TEST	POST TEST

RY	SCIENCE
	POST TEST

MATHEMATICS	
POST TEST	POST TEST

	COMMUNICATIONS
	POST TEST

UNIT 10

ELECTRONIC CIRCUITS

L A B O R A T O R Y

UNIT 10 ELECTRONIC CIRCUITS

OBJECTIVES:

To teach the student the basic combinations of the components covered in the last section in a form so that he will be able to combine them to do a useful task.

PRE POST TEST

Draw a schematic of a simple radio which uses one stage of amplification (AF) and a 110v. power supply.

UNIT 10 ELECTRO

OBJECTIVES:

1. The student
   a knowledge

PRE-POST TEST

ations

able

ich

and

S C I E N C E

UNIT 10 ELECTRONIC CIRCUITS

OBJECTIVES:

1. The students will be able to demonstrate a knowledge of the theory of electronic circuits.

PRE-POST TEST

MATHEMATICS

UNIT 10 ELECTRONIC CIRCUITS

OBJECTIVES:

1. The student will show understanding of a word problem by listing given pertinent information.
2. The student will be able to solve basic algebraic word problems in a pre-determined logical manner.

PRE-POST TEST

1. Explain exactly what is known, what is to be found, and the procedure you would follow in solving this problem:
   At a Book Fair, 600 books were sold, some pocket editions at 35¢ each and the rest hard-covered books at 50¢ each. The total receipts were equivalent to last year's intake when the same number of books were sold at an average price of 40 cents per book. How many of each kind of book were sold?

UNIT 10 EL

PRE-POST T

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COMMUNICATIONS

UNIT 10 ELECTRONIC CIRCUITS

PRE-POST TEST

L A B O R A T O R Y

CONTENT

1. Rectification 68

CONTEN

1. Tu

RY

SCIENCE

CONTENT

1. Tuned circuits (frequency selection)

2. At a certain time two airplanes start from the same airport and travel in opposite directions at 350 miles an hour and 325 miles an hour respectively. In how many hours will they be 2025 miles apart?
3. A train left Omaha at 9 A.M. traveling at 50 mph. At 1 P.M. a plane also left Omaha and traveled in the same direction at 300 mph. At what time did the plane overtake the train?
4. A merchant mixes tea worth 90¢ a pound with some worth $1.50 a pound to make 20 lbs. of a blend which he can sell at $1.20 a pound. How many pounds of each kind of tea does he use?
5. Bill purchased 100 items in a stationery store for one dollar. He bought pencils at 10¢ each, 9 times as many erasers at 5¢ each, and clips at two-for-a-penny. How many of each did Bill buy?

CONTENT

1. Word problems

CONTENT

	COMMUNICATIONS
ite iles a mph. rain? th of d. he use? store each, lips Bill	CONTENT

L A B O R A T O R Y

2. Amplification
3. Frequency selection

METHODOLOGY

1. Lectures
2. Demonstrations
3. Class discussions

STUDENT LEARNING ACTIVITIES

1. Lectures
2. Class discussions
3. Individual experiments
4. Projects

POST TEST

2. Amplifi
3. Rectifi

METHODOLOGY

1. Lectur
2. Class
3. Problem
4. Demonst

STUDENT LE

1. Class
2. Problem

POST TEST

R Y	SCIENCE
	2. Amplification 3. Rectification METHODOLOGY 1. Lecture 2. Class discussion 3. Problem solving 4. Demonstrations STUDENT LEARNING ACTIVITIES 1. Class discussion 2. Problem solving POST TEST

- a. reading for understanding
- b. distance problems
- c. mixture problems

METHODOLOGY

1. Filmstrips
2. Boardwork

STUDENT LEARNING ACTIVITIES

1. Boardwork and classwork
2. Text
3. Homework

POST TEST

ICS	COMMUNICATIONS
	METHODOLOGY STUDENT LEARNING ACTIVITIES POST TEST

EXTRA UNIT

GRAMMAR AND USAGE

This unit will be used along with
all the other units in English.

MATHEMATICS	COM

UNIT: GRAMMAR AND USAGE
(Programmed Mater

OBJECTIVES:

Pupils will be able to:

1. Demonstrate knowl
and punctuation f
2. Convey meaning ac
tenses correctly.
3. Use correct modif
4. Use correct prono
5. Use verbals corre
6. Avoid run-togethe
fragments.

PRE-POST TEST

The standardized test
will be administered be

CONTENT

Grammar and Usage for T

1. The Verb and The
2. Patterns of the S

COMMUNICATIONS

UNIT: GRAMMAR AND USAGE FOR TECHNICAL WRITING (Programmed Material)

OBJECTIVES:

Pupils will be able to:

1. Demonstrate knowledge of capitalization and punctuation in all writing.
2. Convey meaning accurately by using tenses correctly.
3. Use correct modifiers.
4. Use correct pronouns.
5. Use verbals correctly
6. Avoid run-together sentences and sentence fragments.

PRE-POST TEST

The standardized tests from English 2600 Workbooks will be administered before and after each unit.

CONTENT

Grammar and Usage for Technical writing

1. The Verb and The Subject
2. Patterns of the Simple Sentence

M A T H E M A T I C S	C O M M
	3. The Work of M
	4. Building Bett
	5. Understanding
	6. Using Verbs C
	7. Agreement of
	8. Choosing the
	9. Using Pronour
	10. How to Use Ca
	11. Learning to U
	12. Apostrophes a
	METHODOLOGY
	1. Filmstrips
	2. Text (reading)
	3. Practice
	4. Testing
	5. Discussions
	English 2600 Prog throughout the year two weeks in order

3. The Work of Modifiers
4. Building Better Sentences
5. Understanding the Sentence Unit
6. Using Verbs Correctly
7. Agreement of Subject and Verb
8. Choosing the Right Modifier
9. Using Pronouns Correctly
10. How to Use Capitals
11. Learning to Use Commas
12. Apostrophes and Quotation Marks.

METHODOLOGY

1. Filmstrips
2. Text (reading)
3. Practice
4. Testing
5. Discussions

English 2600 Programmed English book will be used throughout the year, but must complete each unit within two weeks in order to finish Program by end of year.

EXTRA UNIT

APPPLIANCE REPAIR

LABORATORY

EXTRA UNIT APPLIANCE REPAIR

OBJECTIVES:

To cover in a more thorough aspect the repair of electrical appliances.

PRE-POST TEST

Physical test based upon faults placed in appliances by the instructor.

ORY	SCIENCE
	EXTRA UNIT APPLIANCE REPAIR
	OBJECTIVES:
ect the	The students will be able to convert a quantity of energy from one form to another.
.	Ex. joules to calories.
	PRE-POST TEST
s	1. Convert 10 joules to calories.
structor.	2. Give five examples of how one form of energy may be converted into another.

MATHEMATICS

EXTRA UNIT APPLIANCE REPAIR

C

EXTRA UNIT APPLIANC

OBJECTIVES:

1. Introduce to the student the study of sets.
2. Show how the study of sets is applicable to all fields of mathematics.
3. Introduce to the student the study of basic geometry.

PRE-POST TEST

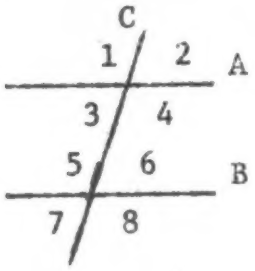
1. $\{1,3,5,7,\}$ $\{2,4,6,8\}$ = ________.
2. If S = $\{1,2,3,4\}$, T = $\{1,3,5\}$, u = $\{2,4,6,8\}$ then TR(SUU) = $\{\ \ \}$.
3. Draw a Venn Diagram illustrating the intersection of these two sets: R = $\{2,4,6,8,10\}$ and S = $\{2,4,8,9\}$.
4. What are parallel lines?
5. What is a transversal?
6. What are corresponding angles?

s	COMMUNICATIONS
	EXTRA UNIT APPLIANCE REPAIR
ble $\{2,4,6,8\}$ inter- $6,8,10\}$	

LABORATORY	

	SCIENCE

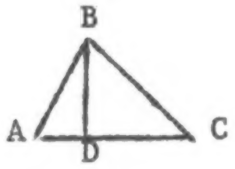
7.



Given that lines A and B are parallel and are cut by transversal C; L1 = 105°.

Find the measure of Ls 2 - 8.

8.

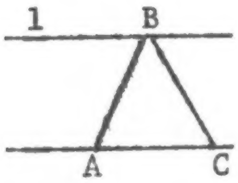


Given: △ ABC is isosceles; BD bisects LB

Prove: △ ABD $\overset{2}{=}$ △ CBD.

9. Give a counterexample as to why proving 3 angles of one triangle congruent to 3 angles of another triangle does not prove the two triangles are congruent.

10.



Using this diagram, with the fact that 1 ∥ $\overline{AC}$, prove that the sum of the interior angles of a △ is 180°.

C S	COMMUNICATIONS
nd B cut $= 105^{\circ}$. sceles; BD bisects LB). ying 3 angles es of another angles are with the fact that the sum les of a △ is 180°.	

LABORATORY

CONTENT

Advanced repair on the major types of appliances such as stove, heater, and air conditioner.

METHODOLOGY

Individual student problems with a discussion on each.

STUDENT LEARNING ACTIVITIES

Actual appliance repair and class discussion.

POST TEST

Y	SCIENCE
	CONTENT
of	1. Heat energy
nd air	2. Electrical energy
	3. Mechanical energy
	4. Light energy
	5. Sound energy
	6. Nuclear energy
	METHODOLOGY
	1. Lecture
	2. Class discussion
	3. Reading assignments
	4. Handouts
	STUDENT LEARNING ACTIVITIES
	1. Class discussion
	2. Reports
	3. Reading assignements
	4. Problem solving
	POST TEST

MATHEMATICS

CONTENT

1. Study of sets
   a. symbols
   b. grouping
   c. Venn diagram
2. Basic geometry

METHODOLOGY

1. Blackboard
2. Transparencies
3. Burns Boards
4. Filmstrips

STUDENT LEARNING

1. Drawing Venn diagrams in class
2. Probing numerous congruent triangles at blackboard.
3. Construction
4. Homework

POST TEST

CONTENT

METHODOLOGY

STUDENT LEARN

POST TEST

COMMUNICATIONS

CONTENT

METHODOLOGY

STUDENT LEARNING ACTIVITIES

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POST TEST

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LANCASTER HIG

VOCATIONAL INTERDISC

June, 1971

202

STER HIGH SCHOOL

TERDISCIPLINARY PROGRAM

Demonstration Programs
of
Vocational Education
in
South Carolina Region V
BAVTE/DVTE Project No. 0-361-0006
Contract No. OEC-0-70-5190(361)

The Lancaster High School

Vocational Interdisciplinary Program

ED058408

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
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11th Grade

Team Members:

James L. Howard	- Electricity Laboratory - Physics
Jacqueline B. Miller	- English
Virginia V. Wade	- Mathematics

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Ways of Evaluating Objectives ---------- 120

Materials ---------- 123

A Proposal of Lancaster High School's
Vocational Interdisciplinary Program of Study

The vocational interdisciplinary program of study, based on the "Richmo

ments. Due to its proven success the "Richmond Plan" has been revised and i

proposal is a description of Lancaster High School's interrelated project, i

Four subjects - electricity, physics, Mathematics, English - were selec

area of emphasis. Mathematics, physics and English were selected from the a

The boys for the program were selected from the eleventh grade in Elect

and teacher recommendations of students having manipulative skills were sele

desired to improve, but didn't know how. Students were given the opportunit

In order to assess the objectives a pre-test will be given in all areas

by the test results will be made. A post-test will be given at the end of t

The goals of the project are:

1. Make school more meaningful to students.
2. Provide more knowledge with which to make decisions.
3. Provide methods by which greater success can be derived throug
4. Prepare students for further education.
5. Coordinate general education with careers.
6. Encourage initiative and confidence.
7. Motivate students.

ncaster High School's

sciplinary Program of Study

study, based on the "Richmond Plan", has recieved wide acclaim for its educational achieve-
lan" has been revised and implemented by many schools throughout America. The following
l's interrelated project, its development and purposes.

atics, English - were selected for the program. Electricity was the chosen vocational
sh were selected from the academic area and correlated with each unit in electricity.
the eleventh grade in Electricity. Test scores of reading ability, mathematics ability
nipulative skills were selection criteria. These students were under-achievers and
s were given the opportunity to elect to participate in the program.
will be given in all areas at the beginning of the semester. Any modification indicated
ll be given at the end of the semester in order to evaluate achievement.

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The program is designed to give the student a marketable skill which he can u
as provide him with educational skills for further education. Such a program prov
allowing the student to follow at open course rather than a restrictive one. Con
or professional area he chooses.

dent a marketable skill which he can use upon completion of high school as well urther education. Such a program provides a broad academic background, e rather than a restrictive one. Consequently, he can enter any vocational

ORIENTATION

LABORATORY

ORIENTATION

OBJECTIVES

Student will be able to :

1. Develop a positive attitude to conduct safety practices at all times.
2. Experimentation with electric lighting, heating, motors and power distribution as applied to domestic, commercial and industrial uses.
3. Work with tools, instruments and equipment common to the electric trade.
4. Learn to read electrical drawing and schematics.
5. Develop entry skills and knowledge to assist in securing employment in a related field.

CONTENT OUTLINE

1. Safety precautions
2. Static Electricity
3. Current flow

ORIENTATI

OBJECTIVE

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CONTENT

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elated field.

S C I E N C E

ORIENTATION

OBJECTIVES

Student will be able to:

1. Develop a positive attitude to conduct safety practices at all times.
2. Demonstrate the nature of matter, the electrical laws as applied to electricity.
3. Application of electrical formulas $\frac{E}{IR}$ $P = I^2.R$ $XL = 2IIFL$ $X_c = \frac{1}{2IIFC}$ $PF = Cos\ \phi$.
4. Work problems in chemistry and recognize their chemical composition using such formulas as shown below.

   $PB + PBO_2 + 2\ H_2\ SO_4 \quad 2\ PBSO4 + 2H_2O$
5. Study the sources of electricity and their uses.

CONTENT OUTLINE

1. The Science of Electronics
   1.1 The nature of matter
   1.2 Molecules and atoms

MATHEMATICS

ORIENTATION

OBJECTIVES

Student will be able to:

1. Demonstrate ability to understand and apply methematical concepts as measured by a pre-test and post-test on each unit and a standardized test given at the beginning and end of the year.
2. Discuss the value of mathematics in electricity.
3. Identify and apply methanical devices for mathematical computation. (Tables, formulas, graphs-calculator, etc.)
4. Complete all objectives of mathematics with an 85% accuracy.

CONTENT OUTLINE

1. Test
    1.1 Standardized test
    1.2 Pre-test - post-test

ORIENTATION

OBJECTIVES

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COMMUNICATIONS

ORIENTATION

OBJECTIVES

Student will be able to:

1. Articulate personal reasons for electing to take electricity in teacher-made test.
2. Set specific goals for himself.
3. Explore post-graduate job opportunities so that he can discuss and evaluate their relevance to his objectives.

CONTENT OUTLINE

1. Interdisciplinary concept in respect to objectives.
2. Personal questionnaire
    2.1 Personal reasons for taking electricity
    2.2 Personal objectives for course.

L A B O R A T O R Y	
4. Conductors and insulators	5. 6. 7. 8.

	SCIENCE
	1.3 Electrons, protons, neutrons 1.4 Ionization 5. Law of charges 6. Coulomb 7. Electrostatic fields 8. Current 8.1 Voltage 8.2 Conductors 8.3 Insulators 8.4 Resistance

2. Textbook:
    - 2.1 Content
    - 2.2 Tables, formulas, graphs
3. Acceptable performance of objectives

STUDENT ACTIVITIES

1. Take achievement tests at the beginning and end of the year.
2. Take pre- and post-test on each unit.
3. Examine textbooks and materials used in the course.
4. Examine mathematical tables, formulas, graphs - calculator, etc.

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COMMUNICATIONS

- 2.3 Career preferences
- 2.4 Discussion of group objectives

3. Post high school possibilities
   - 3.1 Technical school
   - 3.2 College
   - 3.3 Job opportunities
   - 3.4 Community speakers
   - 3.5 Field Trips
   - 3.6 Newspaper ads and articles
4. Pre-tests in reading and English
5. Pre-tests in technical vocabulary

STUDENT ACTIVITIES

1. Answer teacher-made questionnaire and vocabulary tests.
2. List own desires concerning future career plans.
3. List as a class any objectives that will help students achieve individual objectives.
4. Take Metropolitan Standardized Test (Form F) (1970)
5. Explore post-graduate possibilities
   - 5.1 Bring in pertinent information from magazines

LABORATORY

6

SCIENCE

MATHEMATICS	
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COMMUNICATIONS

and newspapers. Make bulletin board.

5.2 Examine books (booklets, brochures) on electrical job possibilities.

5.3 Listen to speakers from community (Duke Power, Lancaster Telephone Co., Springs Co.) Ask questions and discuss information.

5.4 Make field trips in area (Great Falls, Duke Power plant).

UNIT 1

INTRODUCTION TO ELECTRICITY

L A B O R A T O R Y

UNIT 1 INTRODUCTION TO ELECTRONICS

OBJECTIVES

Students will be able to:

1. Apply safety rules in working with electricity.
2. Generate statre electricity by friction and to discover that when two materials are rubbed together, one may gain while the other loses electrons. The material which gains is said to be negatively charged; the other, losing them is said to be positively charged. Vulcanite becomes negatively charged by friction with wool. A licite or glass rod becomes positively charged by friction with silk.
3. Verify experimentally that charged bodies are surrounded by electrostatic fields. An electrostatic field is a region surrounding a charged body in which electrostatic forces can act upon other bodies placed in the field.
4. Verfiy experimentally that static charges can be transferred by induction and by direct contact.

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by direct contact.

S C I E N C E

UNIT 1 INTRODUCTION TO ELECTRONICS

OBJECTIVES

Students will be able to:

1. Gain a basic knowledge of the nature of matter.
2. Prove the law of charges.
3. Verify experimentally that charged bodies are surrounded by electrostatic fields.
4. Work problems to compute flow of electrons.
5. Learn ampacity of copper conductors from 14 AWG to 4/o.

MATHEMATICS

UNIT 1 INTRODUCTION TO ELECTRONICS

UNIT

OBJECTIVES

OBJEC

Students will be able to:

1. Perform the four fundamental operations with rational numbers.
2. Convert fractions to decimals.
3. Calculate square roots of numbers
4. Apply the laws of exponents to powers of numbers.
5. Write decimals in scientific notation and identify significant digits.
6. Explain electrical units and their symbols.

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COMMUNICATIONS

UNIT 1 INTRODUCTION TO ELECTRONICS

OBJECTIVES

Students will be able to:

1. Apply pre-reading, scanning, and close reading skills so that he can explain the content of the material read.
2. Discuss these aspects in assigned short stories that have meaning and relevance for his own life.
3. Evaluate freely selected paperbacks or library books by criteria set up by the class.
4. Define selected electrical terms in chapter with 100% accuracy.
5. Spell 25 word demons with 90% accuracy.
6. List rules of safety in electricity as studied in lab with 100% accuracy.
7. Identify and define at least five new words in reading material.

LABORATORY

5. Verify experimentally that charges of like polarity repel and unlike charges attract.

CONTENT OUTLINE

1. Safety precautions
2. Static Electricity
3. Current Flow
4. Conductors and insulators

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arges attract.

S C I E N C E

CONTENT OUTLINE

1. The Science of Electronics
    1.1 The nature of matter
    1.2 Molecules and atoms
    1.3 Electrons, protons, neutrons
    1.4 Ionization
2. Law of Charges
3. Coulomb
4. Electrostatic fields
5. Current
    5.1 Voltage
    5.2 Conductors
    5.3 Insulators

MATHEMATICS

CONTENT OUTLINE

1. Integers
    - 1.1 Operations with whole numbers
    - 1.2 Operations with negative numbers
    - 1.3 Absolute value
2. Rational numbers
    - 2.1 Operations with fractions
    - 2.2 Convert fractions to decimals
    - 2.3 Operations with decimals
3. Powers of numbers: exponents
    - 3.1 Operations with exponential forms
    - 3.2 Powers of ten
    - 3.3 Scientific notation and significant digits

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COMMUNICATIONS

CONTENT OUTLINE

1. Reading skills
    - 1.1 Pre-reading
    - 1.2 Scanning
    - 1.3 Close reading for details
    - 1.4 Related scientific reading matter (for study skills)
    - 1.5 Notetaking
    - 1.6 Evaluation of fiction
2. Writing skills
    - 2.1 Scientific reports
    - 2.2 Reports on reading
3. Oral communications skills

L A B O R A T O R Y

STUDENT ACTIVITIES

1. Experiment with electrostatic charges. Use electroscope and pith balls to observe palarities and prove the law of charges. Like charges repel- unlike charges attract.
2. Use meters to measure current flow.
3. Experiment with voltage, current and resistance.

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Like charges repel-

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ent and resistance.

SCIENCE

5.4 Resistance

STUDENT ACTIVITIES

1. Draw sketches to depict ionization of atoms.
2. Work problems using formulas $I - \frac{Q}{T}$ to compute electron flow.
3. Work problems dealing with conductors; their resistivity and methods of standardization in sizes.

MATHEMATICS

4. Square roots
5. Exponents
6. Electrical units

STUDENT ACTIVITIES

1. View filmstrips in order to increase accuracy with operations on whole number and fractions.
2. Determine gains or losses from problems concerning football games and business transactions in order to understand negative numbers.
3. Compute electrical power bills.
4. Write electrical units and their symbols.
5. Using simple computer and calculator in solving problems.
6. Use detachable model of a sphere to understand addition and subtraction of fractions.

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COMMUNICATIONS

3.1 Discussion (class and group)

3.2 Reports on interest areas or lab work

3.3 Exchange of ideas on general reading

4. Spelling
5. Vocabulary

STUDENT ACTIVITIES

1. Use lab text or other expository material for reading skill exercises. Pre-reading and scanning can be done easily in a history or science book (most have one or the other). Show improved retention by pre-reading followed by close reading.

   Student reads material as usual and takes test. Student follows course of pre-reading followed by close reading (similar material) and takes test.
2. Student reads materials and gives synopsis.
3. Student states purpose of materials read.
4. Student reads books - both assigned and freely chosen. Librarian introduces students to books

LABORATORY

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	she thinks will be of interest to them by pulling titles and telling them a little about the book. 5. Discuss as a class the assigned books, especially the ways in which the action is relevant to the student's life as to life in general. 6. Set up as a class criteria for judging a book. This should be posted in room and should be changed and added to as students abilities broaden and change. 7. Report orally on self-selected books and evaluate in writing (according to a checklist - a form set up by students is best, but the first one or two may have to be suggested by teacher.) 8. Short oral reports made by individuals on any subject selected from discussions in science class or lab. (Examples: Law of charges, electrostatic field, etc. - may use demonstrations or drawings.)

LABORATORY

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18	9. Group discussions (class discussion if no more than 12 - 15) based on a pre-determined subject. (Examples: school, community, generation gap, drugs, war, pollution, current event - such as Calley Case) 10. Write definitions of scientific terms. 11. Explain orally the terms to the teacher. 12. Write from dictation a prose selection containing spelling demons. 13. Write paper on need for safety rules in electricity. Discuss and list rules of safety used in lab. 14. Write in a journal every day (5-10 min.) in an effort to break down barriers about writing and to give freedom of expression without regard to mechanics. Non-graded, but read weekly by the teacher. Progress shown in use of mechanics and spelling. Teacher gains insight. 15. Play word games - Scrabble, Abaca, teacher-made games, crossword puzzles - to improve word power

LABORATORY	

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WAYS OF EVALU

Unit 1

Pre-test

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16. Each student selects at least five words he has not formerly known from his reading, defines them, and explains them to class. A list which will be retained thoughout year is made, reproduced, and kept by student for future reference and study.

WAYS OF EVALUATING OBJECTIVES

Unit 1

Pre-tests and post-tests in reading skill development

Note taking exercises

Writes synopsis of selected reading material

Testing reading skills (in verbal way by performing skills indicated by teacher. In psychomotor way by carrying out experiment indicated in reading selection)

Book reports made following a form set up by class

Write lab reports (follow form indicated by electricity teacher)

Vocabulary tests (as spelling test, in written material,

LABORATORY

TRAINING AIDS

1. 501 Kit - Lab volt equipment

TEACHER AC

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TRAINING

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S C I E N C E

TEACHER ACTIVITY

1. Unit pre-test
2. Lectures and Demonstrations
3. Unit Test

TRAINING AIDS

1. Blackboard
2. Textbooks
3. 501 Work Kit

MATHEMATICS

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Panels

Explan

CS	COMMUNICATIONS
	in objective test form)
	Spelling
	Panels and discussions
	Explanations of projects being done in lab (on tapes)

UNIT 2

SOURCES OF ELECTRICITY

LABORATORY

UNIT 2 SOURCES OF ELECTRICITY

OBJECTIVES

Students will be able to:

1. Study the construction and operation of a simple Voltaic cell.
2. Study thermal and light sources as generators of electricity, and the Piezoelectric effect of crystals in generating electricity.
3. Study the mechanism of electroplating, and specifically the electroplating of copper.

UNIT 2 SOURCES

OBJECTIVES

Students w

1. Demons
2. Draw

   batte
3. Apply

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	UNIT 2 SOURCES OF ELECTRICITY
tion of a simple as generators of ic effect of ty. ating, and of copper.	**OBJECTIVES** Students will be able to: 1. Demonstrate the sources of electricity. 2. Draw diagrams for making series and parallel battery connects. 3. Apply safety practices in using chemicals.

MATHEMATICS

UNIT 2 SOURCES OF ELECTRICITY

OBJECTIVES

Students will be able to:

1. Perform the fundamental operations exponential powers.
2. Convert powers of ten to logarithms.
3. Convert antilogarithms to powers to ten.
4. Locate numbers on the slide rule.
5. Use slide ruler in order to:

   a) apply the fundamental operations, b) determine squares, c) determine square roots, d) determine cubes and e) determine cube roots.

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COMMUNICATIONS

UNIT 2 SOURCES OF ELECTRICITY

OBJECTIVES

Students will be able to:

1. Select appropriate resource materials so that he can write a well-organized expository report.
2. Write a summary of selected readings of interest.
3. Illustrate relevance of poetry as used in popular music of their own choosing.
4. Develop a unified paragraph by using the topic sentence as a guide.
5. Define selected electrical terms in Chapter with 100% accuracy
6. Spell 25 word demons with 90% accuracy.
7. Identify and define five new words in newspaper reading and T. V. watching.

LABORATORY

CONTENT OUTLINE

1. Batteries
2. Cell connection methods
3. Secondary cells
4. Light, heat, mechanical pressure and magnetic sources.

RATORY

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ical pressure and magnetic

SCIENCE

CONTENT OUTLINE

1. Battery
    1.1 Primary-secondary cells
    1.2 Call components
2. Electrical energy from
    2.1 Light
    2.2 Heat
    2.3 Mechanical pressure
3. Piezoelectric effect

MATHEMATICS

CONTENT OUTLINE

1. Laws of exponents
2. Operations with exponential forms
3. Logarithms
   - 3.1 Writing logarithms and antilogarithms
   - 3.2 Calculations with logarithms
4. Slide rule
   - 4.1 Locating numbers
   - 4.2 Reading numbers
5. Operations with the slide rule
   - 5.1 Multiplication and division with slide rule
   - 5.2 Combined multiplication and division
   - 5.3 Squares and square roots
   - 5.4 Cubes and cube roots

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COMMUNICATIONS

CONTENT OUTLINE

1. Research Materials
    1.1 Library reference materials
    1.2 Other sources
    1.3 Scientific material
    1.4 Historical material
2. Research reports
    2.1 Oral
    2.2 Written
3. Reading
    3.1 Summary
    3.2 Poetry
4. Writing
    4.1 Paragraph development
5. Spelling
6. Vocabulary

L A B O R A T O R Y

STUDENT ACTIVITIES

1. Construct circuits using various sources of electricity; chemical, heat, light, etc.
2. Construct a simple battery.
3. Do experiment on electroplating.
4. Connect batteries in series and parallel and measure output voltage.

Y	SCIENCE
s sources of ght, etc. . parallel and	**STUDENT ACTIVITIES** 1. Draw circuits for connecting batteries and thermocouples in series and parallel. 2. Have an open discussion on the sources of electricity and their various uses.

MATHEMATICS

STUDENT ACTIVITIES

1. Write numbers as powers of ten.
2. Write logarithms and antilogarithms of numbers.
3. Using logarithms compute answers to operations with numbers, powers, and roots of numbers.
4. Use slide rule for calculations.

STUDENT AC

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COMMUNICATIONS

STUDENT ACTIVITIES

1. Research, write, and present to class biographical papers (men of electricity). Work quietly in library, searching out - with help of librarian and teacher - the various resources.
2. Continue study of spelling (writing word as called, making sentences, taking dictation, spelling orally in competition - spelling-bee).
3. Read and discuss the selected readings. (These may be from anything of interest that students are encouraged to read constantly - novels, short stories, newspapers, magazines, etc.)
4. Write a summary of one interesting article. (May vary by having student to tell class about one interesting article). (This was found to be an activity which stimulated interest in reading.)
5. Write paragraph on interesting incident. Use topic sentence as guide to unity.

LABORATORY

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11. Ident
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COMMUNICATIONS

6. Write paragraph on sources of electricity.
7. Play and discuss for class recordings of modern music which have words that are really good poetry (they should make stencil of words so that teacher can reproduce. The modern singers can often not be understood and discussion is more meaningful when students have a copy of words to follow.) Students respond to the words of music as poetry when they will otherwise "turn you off."
8. Read poems - maybe put on tape or on overhead or may be reproduced on stencil - from Stephen Dunning's anthologies especially for teen-agers. Students may comment or not on poems.
9. Write and discuss definitions of technical vocabulary.
10. Make posters, mobiles, collages, etc. to illustrate the meaning of a favorite poem.
11. Identify and define five new words in newspaper reading and from T. V. watching. Make list

LABORATORY

TRAINING AIDS

501 Kit - H. H. Gerrish Work Book

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Y	SCIENCE
	TEACHER ACTIVITY 1. Lecture and demonstrations 2. Show safety film strips **TRAINING AIDS** Components from work kit, text book and overhead projector.

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	WAYS OF EVALUATI
	Unit 2
	A paper on
	electricity
	Vocabulary
	Spelling te
	Write summa
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	Write a par

of words and definitions for future reference and study.

12. Discuss and point out value of concrete words used in poetry.

WAYS OF EVALUATING OBJECTIVES

Unit 2

A paper on historical figure in development of electricity

Vocabulary test

Spelling tests

Write summary of one interesting article

Test on value of concrete words used in poetry.

Write a paragraph developing a given topic sentence.

UNIT 3

CIRCUIT AND POWER

LABORATORY

UNIT 3 CIRCUIT AND POWER

OBJECTIVES

Students will be able to:

1. Study the application of Ohm's Law in the calculation of resistance and to compare calculated resistances with color coded values.
2. Demonstrate the conversion of electricity into power, heat, and light, in a constant Resistance R.
3. Study the effects of resistance changes with temperature of an incandescent lamp filament.
4. Explain what is meant by the "half power point".
5. Verify experimentally that the total resistance of a circuit comprising resistances connected in series is equal to the sum of the individual resistance.
6. Prove by experimentation that the order in which the resistors are joined is immaterial in a series circuit.
7. Demonstrate that the current in a series circuit is

UNIT 3 CIRC

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UNIT 3 CIRCUIT AND POWER

OBJECTIVES

Students will be able to:

1. Identify the value of a resistor by using the color code for resistances.
2. Convert power to heat and light.
3. Use Ohm's Law and Watts Law as applied to series and parallel circuits.
4. Apply Kirchoffs Law.

MATHEMATICS

UNIT 3 CIRCUIT AND POWER

OBJECTIVES

Students will be able to:

1. Utilize their knowledge of dimensions, units, and physical quantities by evaluating formulas.
2. Convert one system of units into another and/or change the size of the unit using a table of decimal prefixes.

UNIT 3

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UNIT 3 CIRCUIT AND POWER

OBJECTIVES

Students will be able to:

1. Use with 100% accuracy the vocabulary necessary to explain Ohm's Law.
2. Determine character as it is shown in assigned short stories and describe the characteristics revealed by prescribed check-list.
3. Write lab reports, following a prescribed form set up by the lab teacher.
4. Develop a coherent paragraph which emphasizes transitional words and phrases.
5. Spell 25 word demons with 90% accuracy.
6. Define in writing assigned electrical terms from chapter with 100% accuracy.

LABORATORY

constant throughout and that the position of the Ammeter with respect to the resistance makes no difference.

8. Prove by experimenting what happens when the series circuit is opened at any point.

9. Verify by connecting meters in the circuit that the current in a series circuit is constant in any part of the circuit, the total voltage drop around the circuit is equal to the sum of the individual voltage drops across the resistance elements in the circuits, and that this is equal to the applied or source voltage.

10. Arrive at the conclusion that there are three general laws concerning series circuits:

    (a) The total resistance in a series circuit is equal to the sum of the individual resistances.

    (b) That the current in a series circuit is constant throughout the circuit.

    (c) The total voltage drop in a series circuit

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MATHEMATICS

S	COMMUNICATIONS

LABORATORY	

is equal to the sum of the voltage drops across the resistive elements of the circuit.

11. Calculate the total resistance of a circuit containing resistances connected in parallel, using both the coded values and the value measured with an Ohmmeter.
12. Determine the parallel by the voltmeter - Ammeter method and using Ohm's Law.
13. Determine the total resistance of parallel connected lamps.
14. Demonstrate that the removal of ones resistance or lamp in a parallel circuit does not open the circuit as in the case of series connected components.
15. Study the characteristics of parallel circuits, and to compare current claculated by Ohm's Law with measured values in the branch circuits.
16. Verify experimentally that the total resistance R total of a series parallel resistance circuit is R total = R_1 and R_2.

	SCIENCE
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MATHEMATICS

COMMUNICATIONS

L A B O R A T O R Y

17. Verify that the voltage across each resistor in a parallel circuit is the same as the voltage across the entire parallel circuit.

CONTENT OUTLINE

1. Uses of meters
2. Resistive circuits
   - 2.1 Series
   - 2.2 Parallel
   - 2.3 Combination
3. Projects

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SCIENCE

CONTENT OUTLINE

1. Conductors
2. Resistance and Resistors
3. Ohm's Law
4. Power Law
5. Circuits
    - 5.1 Comb. and Equivalent circuits
    - 5.2 Series circuits
    - 5.3 Parallel circuits
    - 5.4 Potentiometers
    - 5.5 Kirchoff's Laws

M A T H E M A T I C S

__CONTENT OUTLINE__

1. Dimensioned numbers
2. Units
3. Quantities
   - 3.1 Physical
   - 3.2 Electrical
4. Conversion factors

__CONTENT__

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TICS	COMMUNICATIONS

CONTENT OUTLINE

1. Ohm;s Law
    1.1 Vocabulary
    1.2 Meaning
2. Reading
    2.1 Character analysis
    2.2 Short stories
    2.3 Magazines
3. Writing
    3.1 Lab reports
    3.2 Short book reviews
    3.3 Transitional words and phrases
4. Spelling
5. Vocabulary

LABORATORY

STUDENT ACTIVITIES

1. Construct and experiment with series and parallel DC circuits, equivalent circuits and voltage dividers.
2. Prove that the current is constant in a series circuit and that the sum of the voltage drops equals the applied voltage.
3. Measure and prove that R_T is parallel circuits is smaller than the smallest resistor.
4. Do all experiences in work book on this chapter.

STUDENT A

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S C I E N C E

STUDENT ACTIVITIES

1. Use resistors from work kit to compare coded value with measured value.
2. Work problems using Ohm's, Watts and Kirchoffs Law.
3. Learn to use formulas: $\frac{E}{I.R}$ $P = I \times E$ $p = I^2 \times R$

$$P = \frac{E^2}{R} \quad \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

M A T H E M A T I C S

STUDENT ACTIVITIES

1. Examine table of decimal prefixes and use the factors in writing units of one system into another system.
2. Work problems using conversion factors.

STUDENT AC

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ICS	COMMUNICATIONS
es and use one system factors.	STUDENT ACTIVITIES 1. Write and explain technical vocabulary involved in Ohm's Law. 2. Write reports on some aspect of electricity being studied in lab. (Series and parallel circuits - use schematic drawings, relays, resistance, voltage and current, Watt's Law, Kirchoff's Law - use any demonstration available to make clear. 3. Discuss assigned short stories selected to emphasis character. 4. Write characterization of fictional character 5. Write charaterization of some individual well known to the student. 6. Write paragraph in which the student uses transitional devises to move his paragraph along and to help his reader understand better what he is writing about. 7. Define and discuss electrical terms that were assigned.

LABORATORY

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M A T H E M A T I C S

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Unit 3

Lab reports

Paper expla

Individual

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Write chara

Discussion

Vocabulary

Spelling (t

Paragraph (

elements)

TICS	COMMUNICATIONS

8. Write spelling word from a called list (may be put on tape so that students may repeat test)

WAYS OF EVALUATING OBJECTIVES

Unit 3

Lab reports specified from those already given

Paper explaining Ohm;s Law

Individual demonstrations of application of law (may be done orally, on tape, in paper)

Write characterization

Discussion of reading matter

Vocabulary test

Spelling (tests and composition)

Paragraph (illustrating use of good transitional elements)

LABORATORY

TEACHER ACT

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ORY	SCIENCE

TEACHER ACTIVITIES

1. Lecture and demonstration
2. Use V + U M to teach meter reading.

TRAINING AIDS

1 Work Kit - Meters

Blackboard

UNIT 4

MAGNETISM

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LABORATORY

UNIT 4 MAGNETISM

OBJECTIVES

Students will be able to:

1. Study the properties of permanent magnets.
2. Verify experimentally that magnets are surrounded by invisible fields or regions in which magnetic forces are present.
3. Prove by using Permenant magnets that like magnetic poles repel and unlike magnetic poles attract each other.
4. Trace the position and shape of magnetic lines of force in the plane of the cardboard used, with iron filings, and to learn that lines of force emerge from one pole of the magnet, pass through the surrounding space and enter the other pole of the magnet.
5. Study the magnetic effects produced in conductors carrying electric currents when such conductors are straight wires or in form of coils.

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SCIENCE

UNIT 4 MAGNETISM

OBJECTIVES

Students will be able to:

1. Demonstrate the Laws of nagnetism.
2. Construct an electromagnet.
3. Shield magnetism.

MATHEMATICS

UNIT 4 MAGNETISM

OBJECTIVES

Students will be able to:

1. Write the subsets of rational numbers.
2. Illustrate orally and written the properites of rational numbers by and algebraic expressions.
3. Apply the order of operations when given an algebraic expression.
4. Analyze and identify linear functions.
5. Determine solutions of linear functions.
6. Analyze and explain graphs of linear functions.
7. Derive algebraic and graphic solutions of systems of linear functions.

UNIT 4

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COMMUNICATIONS

UNIT 4 MAGNETISM

OBJECTIVES

Students will be able to:

1. Write a paper using the text as sole source of reference.
2. Demonstrate development in use of punctuation by punctuating with 90% accuracy 20 sentences assigned.
3. Spell 25 words demons with 90% accuracy.
4. Define assigned electrical terms with 100% accuracy.
5. Write a well-organized three paragraph composition, following a prescribed guide-line.

LABORATORY

6. Recognize some of the properties of magnetic circuits.
7. Demonstrate that the magnetomative force establishing lines of magnetic flux is proportional to the ampere-turns of the coil.
8. Verify that the resistance offered to the flow of the magnetic flux depends upon the material forming the magnetic path and that the resistance offered to the flow of magnetic flux by iron is very low compared with an on path.
9. Prove by experiment that magnetic flux passes with ease through non-magnetic substances, such as glass, as if the substance were not there at all.

CONTENT OUTLINE

1. Laws
2. Magnetic Fields (permanent magnets)
3. Solenoids and electromagnets
4. Relays

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CONTENT OUTLINE

1. Laws of magnetism
2. Magnetic Circuits
    - 2.1 Reluctance
    - 2.2 Gilberts
    - 2.3 Electromagnets

M A T H E M A T I C S

CONTENT OUTLINE

1. Number line - rational numbers.
2. Order of operations
3. Algebraic symbols
   - 3.1 Signs of operations
   - 3.2 Signs of grouping

CONT

I C S	COMMUNICATIONS
	CONTENT OUTLINE 1. Oral communication 1.1 Laws of magnetism 1.2 Discussion of projects 2. Composition 2.1 Structure of sentence and paragraph

LABORATORY

STUDENT ACTIVITIES

1. The student will experiment to learn that:

   a north pole attracts a south pole.

2. a north pole will repel a north pole.

3. Do experiences in Gerrish work book.

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S C I E N C E

3. Relay-circuit breaker
4. Magnetic Shields

STUDENT ACTIVITIES

1. Work problems using Rolands Law.
2. Observe magnetic field around a permanent magnet.
3. Open discussion on the use of magnetism.

MATHEMATICS

4. Algebraic expressions
    - 4.1 Evaluating algebraic expressions
    - 4.2 Properties of real numbers
    - 4.3 Operations with algebraic expressions
5. Linear equations
    - 5.1 Writing and solving linear equations
    - 5.2 Substituting in and solving formulas

STUDENT ACTIVITIES

1. Construct number line and identify subsets of rational numbers
2. Compute solutions of linear equations.

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COMMUNICATIONS

2.2 Organization of 3 paragraph paper

3. Language

   3.1 Grammar

   3.2 Usage

   3.3 Punctuation

4. Spelling

5. Vocabulary

STUDENT ACTIVITIES

1. Write a paper on magnetism.
2. Will correct major rules of punctuation - emphasis on major commas and end punctuation - by correcting errors in composition and by correcting prose material that has been incorrectly punctuated.
3. Correct exercises involving subject - verb agreement, pronoun antecedent agreement in composition. (Severe problems in these areas will be corrected by exercises in English 2600 and Steps to Composition).

LABORATORY

RATORY	SCIENCE

MATHEMATICS

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Unit 4

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COMMUNICATIONS

4. Demonstrations of use of magnetism used in electricity. Must use drawings or lab demonstrations in explanations. (Example: magnetic field, flux, doorbell, circuit breaker, electromagnet, magnetic shielding)
5. Write a three paragraph paper on pollution, using current magazines, newspspers, etc., as resource material.
6. Play Scrabble and other word games.
7. Make up crossword puzzles with vocabulary words.
8. Have oral "spelling bee" followed by written spelling lesson - sentences using words with key words left out - rec--ve.

WAYS OF EVALUATING OBJECTIVES

Unit 4

Vocabulary tests

Spelling tests

Develop paragraph with supporting details

Oral and written discussions on development and use of language

LABORATORY	
	TEACHER ACTIV 1. Dem TRAINING AIDS Work Kit Blackboa Meters

SCIENCE

TEACHER ACTIVITIES

1. Demonstrations

TRAINING AIDS

Work Kit Components

Blackboard

Meters

MATHEMATICS

COMMUNICATIONS

Grammar usage tests

UNIT 5

GENERATORS

LABORATORY

UNIT 5 GENERATORS

OBJECTIVES

Students will be able to:

1. Prove by experiment that when a conductor or conductors cut magnetic lines of force, a voltage is induced in the conductors.
2. Prove by experiment that the faster rate at which the lines of force are cut, the greater the magnitude of the induced voltage.
3. Verify that if the conductor moves and the magnetic field is fixed or if the conductor is fixed and the magnetic field moves, a voltate will be produced.
4. Prove that a DC motor is potentially a DC generator.

UNIT 5 GENER

OBJECTIVES

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UNIT 5 GENERATORS

OBJECTIVES

Students will be able to:

1. Demonstrate how to convert electrical energy to mechanical energy.
2. To tell the difference in AC and DC.
3. Recognize a type of generator (shunt - compound) by looking at an electrical schematic of the generator question.

MATHEMATICS

UNIT 5 GENERATORS

OBJECTIVES

Students will be able to:

1. Identify kinds of angles and triangles.
2. Calculate measure of angles.
3. Apply the Pythogorean Theorem in deriving solutions of the right triangle.
4. Identify the six trigonometric functions.
5. Apply trigonometric functions in determining solutions of the right triangle.

UNIT 5 GENE

OBJECTIVES

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COMMUNICATIONS

UNIT 5 GENERATORS

OBJECTIVES

Students will be able to:

1. Discuss theme of assigned novel as indicated by guidelines set by teacher.
2. Write technical reports following a prescribed form selected by lab teacher.
3. Spell 25 word demons with 90% accuracy.
4. Describe clearly, step by step construction of a selected item such as a generator or doorbell.
5. Demonstrate proficiency in the use of pronoun agreement by selecting the correct form in sentences with 90% accuracy.
6. Define assigned electrical terms from Chapter with 100% accuracy.

LABORATORY

CONTENT OUTLINE

1. Relative motionfield and conductor
2. Construction of simple generator
3. Voltage and Current regulation
4. Phase displacement

STUDENT ACTIVITIES

1. Build a simple generator
2. Prove that no current flows when motion is stopped.
3. Apply left hand rule.

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STUDENT AC

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S C I E N C E

CONTENT OUTLINE

1. Electrical energy from mechanical energy
   1.1 Lenz's Law
   1.2 Construction of a generator
2. Types of generators
3. Voltage-current regulation
4. Alternating current - alternator

STUDENT ACTIVITIES

1. Draw schematic diagrams
2. Observe demonstrations
3. Work problems dealing with AC using formulas -

$E_{FFF} = .707\ E_{MAX}$ $E_{AVE} = .637\ E_{MAX}$

MATHEMATICS

CONTENT OUTLINE

1. Angles
    1.1 Kinds of angles
    1.2 Measurement of angles
2. Triangles
3. Elements of trigonometry
    3.1 Trigonometric functions
    3.2 Inverse trigonometric functions
    3.3 Solving right triangles

STUDENT ACTIVITIES

1. Construct angles and triangles using rulers, protractors and compasses.
2. Write trigonometric functions.
3. Compute lengths of sides and sizes of angles of the right triangle by use of Pythogorean Theorem and/or trigonometry.
4. View film - Pythogorean Theorem

CONTENT OUTLINE

1. Readi
    1.1
    1.2
    1.3
2. Oral
3. Writi
    3.1
    3.2
4. Spell
5. Vocab

STUDENT ACTIVIT

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COMMUNICATIONS

CONTENT OUTLINE

1. Reading
    1.1 Scientific material
    1.2 Language development
    1.3 Theme
2. Oral communication
3. Writing
    3.1 Technical written reports
    3.2 Pronoun agreement
4. Spelling
5. Vocabulary

STUDENT ACTIVITIES

1. Read and discuss novel (Ox-Bow Incident or Brave New World). Discuss themes and write paper on how they relate to today's world and the values of the individual.
2. Demonstrate a construction of an item such as a generator, a switch, doorbell, electromagnetic, etc. Use schematic drawings or models.

LABORATORY

RATORY	SCIENCE

MATHEMATICS

5. View filmstrip - trigonometric functions.

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Unit 5

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COMMUNICATIONS

3. Write a short composition explaining voltage - current regulation, on alternating current, or some other selected subject.
4. Spelling
5. Use pronoun - antecedent agreement correctly by selecting the standard form in a series of sentences. Observe good usage in composition.
6. Define in writing electrical terms and explain orally their useful application in electricity.
7. Read magazines, novels, short stories - report on these orally from time to time but not always required to report in same way.

WAYS OF EVALUATING OBJECTIVES

Unit 5

Tests on use of:

Write paper on electrical project

Spelling test

Vocabulary test

Paper on construction of generator, switch, doorbell, etc.

Discussion (oral)

L A B O R A T O R Y

TRAINING AIDS

501 Kit and Work books

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SCIENCE

TEACHER ACTIVITIES

1. Work example problems
2. Demonstrate generator principles

TRAINING AIDS

Work Kit

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MATHEMATICS	C
	Pronoun-ante

ICS	COMMUNICATIONS
	Pronoun-antecedent agreement test

UNIT 6

INDUCTIONS AND R L CIRCUITS

L A B O R A T O R Y

UNIT 6 INDUCTIONS AND R L CIRCUITS

OBJECTIVES

Students will be able to:

1. Study the effects of inductance in dc and ac circuits and to demonstrate the development of counter emfs of self induction. To demonstrate the high counter emf developed in an inductance when the current is interrupted.
2. Demonstrate that when the dc current has reached a steady value the inductance has no effect on the current flow which is then determined entirely by the resistance in the inductor and the circuit.
3. Demonstrate the effect of mutual-induction, i.e., the effect of one coils magnetic field upon the other.
4. Demonstrate the effect of an iron core on a coils inductance.
5. Construct a simple, double wound transformer with

UNIT 6 INDU

OBJECTIVES

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	UNIT 6 INDUCTIONS AND R L CIRCUITS
in dc and ac development on. To demon- eloped in an interrupted. rrent has reached as no effect on the rmined entirely or and the l-induction, agnetic field on core on a coils d transformer with	OBJECTIVES Students will be able to: 1. Demonstrate what inductance is and how it reacts in an electrical circuit. 2. Apply the Laws of AC circuits and how they differ from DC. 3. Verify by experimentation how a transformer can raise a voltage from a low value to a higher value.

M A T H E M A T I C S

UNIT 6 INDUCTIONS AND R L CIRCUITS

OBJECTIVES

Students will be able to:

1. Perform the four fundamental operations with algebraic fractions.
2. Find factors of polynomials.
3. Solve fractional equations.

UNIT 6 INDUCTIO

OBJECTIVES

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COMMUNICATIONS

UNIT 6 INDUCTIONS AND R L CIRCUITS

OBJECTIVES

Students will be able to:

1. Give clear oral explanations as demonstrated by explaining lab procedures.
2. Write a composition in which he supports his own opinion about some issue.
3. Write a report based on assigned novel, using outline set up by teacher.
4. Spell 25 word demons with 90% accuracy.
5. Demonstrate ability in subject-verb agreement by selecting correct forms in sentences at least 90% of the time.
6. Define assigned electrical terms with 100% accuracy.

an open core.

6. Recognize the significance of the voltage-turns ratio of a transformer.

7. Recognize that the transformer depends, for its action, upon the mutual inductance between the two windings, and that the mutual inductance is greater with an iron core than without one.

CONTENT OUTLINE

1. Coils
2. Transformers
3. Simple AC circuits involving resistance and inductance.

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SCIENCE

CONTENT OUTLINE

1. Inductance-mutual inductance
2. Transformer
    - 2.1 Losses
    - 2.2 Induction coil
    - 2.3 Phase relationship
    - 2.4 Ignition System
3. Inductance-factors
    - 3.1 Series and parallel
    - 3.2 AC circuits
    - 3.3 Induced current and voltage

MATHEMATICS

CONTENT OUTLINE

1. Algebraic fractions
   - 1.1 Equivalent algebraic fractions
   - 1.2 Greatest common factor
2. Factoring polynomials
3. Fractional equations

CONTEN

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COMMUNICATIONS

CONTENT OUTLINE

1. Oral communication
    1.1 Circuit diagram report
    1.2 Use of transformer
    1.3 Class discussion of current events of interest.
2. Composition
    2.1 Paragraph structure
    2.2 Supporting details
    2.3 Transition elements
    2.4 Subject-verb agreement

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LABORATORY

STUDENT ACTIVITIES

1. Experiment with inductance using coils to prove that a higher counter emf is produced when the circuit is interrupted.
2. Do work book experiences.

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SCIENCE

3.4 Reactive power

4. Resistance and inductance in AC circuit

    4.1 Ohm's Law

    4.2 Power factor

STUDENT ACTIVITIES

1. Work problems with inductance circuits, series and parallel.
2. Work problems use turns ratio.
3. Draw schematics of transformers.
4. Compute power losses in AC circuits.

MATHEMATICS

STUDENT ACTIVITIES

View filmstrip on factoring and solving fractional equations.

1. Write operations with algebraic fractions.
2. State orally and write the factors of polynomials.
3. Compute solutions of fractional equations and problems

3. Readi
4. Spell
5. Vocab

STUDENT ACTIVIT

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C O M M U N I C A T I O N S

3. Reading
4. Spelling
5. Vocabulary

STUDENT ACTIVITIES

1. Explain orally circuit diagrams.
2. Explain what inductance is and how it reacts in an electrical circuit.
3. Discuss current event of interest.
4. Spell words as they are dictated on tape.
5. Write an evaluation of an assigned book by stating the purpose of the author, by describing an incident of high interest, and giving a personal evaluation of book based on criteria set up by the class.
6. Write a composition stressing the use of transitional words and phrases and arranging details so that one idea is explained clearly.
7. Explain in a written composition the work of a

LABORATORY

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	TEACHER ACTIVITY Demonstrations Work example problems **TRAINING AIDS** 501 Work Kit Blackboard

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Unit 6

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Spelling

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transformer.

8. Work at individual rate on Sect. _____ in *English 2600*. Take pre-tests and post-tests.
9. Write spelling words from dictation.
10. Define in writing the electrical terms assigned and discuss their use in electricity.

WAYS OF EVALUATING OBJECTIVES

Unit 6

Oral explanation of circuits

Group projects which will explain all aspects of electricity class project

Vocabulary tests

Spelling

Some written project

UNIT 7

CAPACITANCE IN ELECTRICAL CIRCUITS

L A B O R A T O R Y

UNIT 7 CAPACITANCE IN ELECTRIC CIRCUITS

OBJECTIVES

Students will be able to:

1. Prove by experiment that capacitors conduct alternating current but not direct current.
2. Verify by experiment that capacitors connect to a DC source of voltage, will charge up to the applied voltage. When disconnected, they become sources of voltage capable of giving an electric shock.
3. Demonstrate that varying voltages across a capacitor will cause the capacitor to charge or discharge to the new voltage levels and that the direction of the charge and discharge currents are opposite in polarity.

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S C I E N C E

UNIT 7 CAPACITANCE IN ELECTRIC CIRCUITS

OBJECTIVES

Students will be able to:

1. Recognize what capacitance is and how it reacts in an electrical circuit.
2. Compute capacitor in series and parallel circuits.
3. Compute transcient responses and time constants.

UNIT 7 CAPACITANCE IN ELECTRICAL CIRCUITS

UNIT

OBJECTIVES

OBJEC

Students will be able to:

1. Distinguish between irrational and rational numbers.
2. Simplify radicals.
3. Perform the basic operations with irrational numbers.
4. Derive solutions of irrational equations.

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COMMUNICATIONS

UNIT 7 CAPACITANCE IN ELECTRICAL CIRCUITS

OBJECTIVES

Students will be able to:

1. Present clear, well-organized explanations which will be evaluated by a checklist.
2. Extract and list basic and secondary facts from assigned reading selection.
3. Comprehend with 90% accuracy an assigned reading selection. Evaluation will be made by answering test items.
4. Use coordinate and subordinate conjunctions by rearranging assigned sentences so that different relationships are shown.
5. Spell 25 word demons with 90% accuracy.
6. Define assigned electrical terms from chapter with 100% accuracy.
7. Define assigned list of vocabulary words selected from reading with 85% accuracy.

LABORATORY

CONTENT OUTLINE

1. Types
2. Transient response
3. RC time constants
4. Reactance
5. Phase shift

STUDENT ACTIVITIES

1. Experiment with Capacitance Circuits by doing experiences in work book by Gerrish

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CONTENT OUTLINE

1. Types of capacitors
2. Transient Response
3. Parallel and series circ.
4. Capacitance in AC circuits
5. Resistance and capacitance in AC circuits

STUDENT ACTIVITIES

1. Work problems to compute series and parallel capacitance circuit.
2. Work problems using formulas

$X_c = \frac{1}{2\pi FC}$ $Z=\sqrt{R^2 + X_C^2}$ PF. COS 9

MATHEMATICS

CONTENT OUTLINE

1. Real numbers
    1.1 Irrational numbers
    1.2 Rational numbers
2. Operations with real numbers
3. Irrational equations

STUDENT ACTIVITIES

1. Draw number line indicating subsets of real numbers.
2. Compare irrational and rational numbers by giving two examples of each.
3. Compute solutions of irrational equations.

CONTENT

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STUDENT

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COMMUNICATIONS

CONTENT OUTLINE

1. Oral communication
    - 1.1 Explanation of capacitance
    - 1.2 Speech preparation and delivery
2. Reading
    - 2.1 Short novel (read by class)
    - 2.2 Comprehension exercises
    - 2.3 Related electrical readings
    - 2.4 Basic and secondary facts
    - 2.5 Reader's Digest
3. Writing
    - 3.1 Coordinate conjunctions
    - 3.2 Subordinate conjunctions
4. Spelling
5. Vocabulary

STUDENT ACTIVITIES

1. Make speech which has been carefully prepared to explain as clearly as possible capacitance in electrical circuits. (This could be broadened to include other subjects from chapter.)

LABORATORY	
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Unit 7

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COMMUNICATIONS

2. Use English 2600 and Steps in Composition to improve use of subordination in writing.
3. Read newspaper, magazine, or other factual reading material, cut article out and attach it to a sheet of paper, list main idea, basic and secondary facts.
4. Change sentences by using subordination.
5. Read from Houghton, Mifflin reading comprehension series Action, using workbook to answer questions selected for assigned stories. (Also use SRA Reading Lab for those having great difficulty.)
6. Correct assigned mispelled words used in sentences.
7. Use electrical terms in appropriate sentences which reveal meaning of term.

WAYS OF EVALUATING OBJECTIVES

Unit 7

Oral reports

1. circuit of battery
2. technical readings

LABORATORY

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TEACHER ACTIVITIES

Example problems and demonstrations

TRAINING AIDS

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MATHEMATICS	
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COMMUNICATIONS

Vocabulary tests

Test on subordination and coordination

Test on reading comprehension

Spelling

Speeches based on subjects selected by each student after consultation with teacher.

UNIT 8

TUNED CIRCUITS RCL NETWORKS

L A B O R A T O R Y

UNIT 8 TUNED CIRCUITS RCL NETWORKS

OBJECTIVES

Students will be able to:

1. Verify by computation that a circuit is at resonance when the inductive and capacitive reactances become equal and cancel each other at the resonant frequency. $F_o \; \frac{1}{2\pi LC}$, when L and C are the inductance and capacitance in Henrys and Farads, respectively.
2. Study the effects of varying the frequency of the supply voltage above and below the resonant frequency.
3. Verify the importance of the Q of the circuit and how it is related to band and frequency discrimination.
4. Study the characteristics of parallel resonant circuits.
5. Verify by computation that the resonant frequency is determined and related by the same formula used

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UNIT 8 TUNED CIRCUITS RCL NETWORKS

OBJECTIVES

Students will be able to:

1. Work porblems in electrical circuits with resistance - inductance and capacitance.
2. Understand filter circuits, by pass circuits and their uses by a careful study of this chapter.

M A T H E M A T I C S

UNIT 8 TUNED CIRCUITS RCL NETWORKS

OBJECTIVES

Students will be able to:

1. Derive solutions of quadratic equations by: (a) factoring, (b) completing the square, (c) the quadratic formula.
2. Construct tables and graphs of quadratic equation - parabola.

UNIT 8 TUNED

OBJECTIVES

Students

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C O M M U N I C A T I O N S

UNIT 8 TUNED CIRCUITS RCL NETWORKS

OBJECTIVES

Students will be able to:

1. Interpret items on job application by studying and constructing various forms.
2. Demonstrate currently accepted conduct in a role playing personal interview activity measured by a checklist of appropriate behavior items.
3. Write a summary report on freely selected reading material, using an established guide.
4. Spell 25 word demons with 90% accuracy.
5. Use assigned electrical terms from chapter with 100% accuracy.
6. Demonstrate word power through use of assigned exercises using analogies, synonyms, antonyms, and homonyms.

LABORATORY

in the study of Series Resonance,

$$F = \frac{1}{2\pi\sqrt{LC}}$$

6. Verify that resonance occurs when the inductive and capacitive currents become equal at the resonant frequency, F_o.
7. Prove by experiment that the impedance of a parallel LC circuit is maximum at resonance, with the line current at a minimum. These conditions are reversed from those considered in Series Resonance where the line current is maximum and the impedence is minimum.

CONTENT OUTLINE

1. Resonance
2. Acceptor circuits
3. Tank circuits
4. Filters

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SCIENCE

CONTENT OUTLINE

1. Resonance
2. The acceptor circuit
3. Tank circuit
4. Reject circuit
5. Loading tank circuit
6. Filtering circuit

MATHEMATICS

CONTENT OUTLINE

1. Quadratic equations
    - 1.1 Factoring quadratics
    - 1.2 Completing the square
    - 1.3 Quadratic formula
2. Graph real roots of parabola

CONTENT OU

1.

2.

COMMUNICATIONS

CONTENT OUTLINE

1. Oral communication
    1.1 Interview - role-playing
2. Reading
    2.1 Summary
    2.2 Magazines - newspapers
    2.3 Novels (parallel)

L A B O R A T O R Y

7.

STUDENT ACTIVITIES

1. Do work book experience projects in work book by Howard Gerrish.

STUDENT A

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2.

s in

SCIENCE

7. **Filters**

    7.1 Low-pass

    7.2 High-pass

    7.3 Tuned circuit

STUDENT ACITVITIES

1. Work problems using R L & C in seriers & parallel.
2. Draw electrical circuits.

MATHEMATICS

3.

4.

5.

STUDENT ACTIVITIES

1. Construct graphs of parabolas
2. Compute solutions of quadratic equations
3. View filmstrip of quadratic equations

STUDENT

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2.

COMMUNICATIONS

tions

ns

3. Writing
    3.1 Technical reports
    3.2 Application blanks
    3.3 Book reports
4. Spelling
5. Vocabulary

STUDENT ACTIVITIES

1. Fill out various application blanks from area plants and businesses. Discuss reasons for particular questions and construct an application blank that the class feels includes essential information.
2. Role play an interview. First discuss and set up standard of behavior list for a personal interview. Form groups of two's in which the participants "practice" both the role of applicant and interviewer. Several should be presented to class. Students may not need the practice period if they have become accustomed

LABORATORY	

	SCIENCE

MATHEMATICS

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WAYS OF

Unit 8

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to performing before the class.

3. Read articles from Reader's Digest, other sources and write a summary. (By this time student probably will be able to write a more complex report, following a checklist set up by class or teacher.) This activity is a good one for oral reports.
4. Write a list of dictated spelling words and write a sentence with each, (or part).
5. Each student submits five words (and the definitions) taken from his reading. A class list will be composed for future reference and study.
6. Play Scrabble and other word games for improved word power.
7. Define in writing electrical terms.

WAYS OF EVALUATING OBJECTIVES

Unit 8

Vocabulary tests

LABORATORY	
	TEACH
	TRAIN

TEACHER ACTIVITIES

Lecture and example problems.

TRAINING AIDS

Blackboard

M A T H E M A T I C S	C
	Lab reports Critique of la Progress repor Complete a job Discuss in wri formation incl Describe in wr as prescribed Write summary Spelling Tests Complete exerc antonyms, and

COMMUNICATIONS

Lab reports

Critique of lab procedure

Progress report of activities in lab

Complete a job application form

Discuss in writing the need for the kinds of information included on application blanks

Describe in writing the successful type interview as prescribed by the class

Write summary of newspaper article

Spelling Tests

Complete exercises involving analogies, synonyms, antonyms, and homonyms

UNIT 9

ELECTRIC MOTORS

LABORATORY

UNIT 9 ELECTRIC MOTORS

OBJECTIVES

Students will be able to:

1. Demonstrate the force acting on a current carrying conductor in a magnetic field.
2. Construct a dc motor, with permanent magnets supplying the magnetic field in which the armature rotates.
3. Verify that a dc motor is potentially a generator and how counter emf effects armature rotation.
4. Demonstrate the association between the direction of motion, the direction of the current flow and the direction of the magnetic flux by Flemings right hand rule (the old conventional left hand rule for motors). The change has come above because current flow is now considered as being in the direction of electron movement.
5. Construct a dc series motor (Universal Motor) and to demonstrate that it will also operate on

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SCIENCE

UNIT 9 ELECTRIC MOTORS

OBJECTIVES

Students will be able to:

1. Apply the principles of electric motors and their uses.
2. Demonstrate the difference in ac and dc motor operation.
3. Reverse ac and dc motor rotation.
4. Identify the names of types of motors and to recognize them by looking at schematics.

MATHEMATICS

UNIT 9 ELECTRIC MOTORS

OBJECTIVES

Students will be able to:

1. Graph linear relations and functions by instilling the ideas of slope and direct variation.
2. Graph quadratic relations and functions.
3. Graph an inverse variation - hyperbola.
4. Solve problems concerning direct and inverse variation.
5. Solve quadratic systems of equations algebraically and graphically.

UNIT 9 ELECTRIC

OBJECTIVES

Students w

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C O M M U N I C A T I O N S

UNIT 9 ELECTRIC MOTORS

OBJECTIVES

Students will be able to:

1. Develop skill in written communication by writing letters.
2. Read critically by applying to a novel a check list of specific items that are applicable.
3. Comprehend with 90% accuracy assigned reading matter by answering questions on the specific selections.
4. Make oral scientific reports which are evaluated by checklist evolved from experience throughout year. (In other words, one that the class sets up near end of year.)
5. Write creatively a description of a picture which is evaluated by individual conference.
6. Interpret poetry by giving subjective response supported by explanation that comes within the structure of the poem.

L A B O R A T O R Y

alternating current.

6. Demonstrate that the speed can be controlled by varying the applied voltage.

7. Reverse the direction of rotation of the motor.

8. Study the characteristics of and to construct shunt field and compound wound motors.

9. Demonstrate that it is possible to increase the speed of a compound wound motor by weakening the field flux by using a rheostat for a control.

10. Construct a synchronous motor and to learn that a single phase synchronous motor is not self starting but must be brought up to synchronous speed before it will lock in with the line frequency.

11. Verify that a synchronous motor is a constant speed motor as long as the frequency of the supply does not change and that if the frequency increases the motor speed increases and vice versa.

12. Learn that the synchronous speed of the motor depends also upon the number of pairs of poles on the rotor. 100

	SCIENCE
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motor depends	
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MATHEMATICS	
	7. Spel 8. Defi • with

COMMUNICATIONS

7. Spell 25 word demons with 90% accuracy.

8. Define assigned electrical terms from chapter with 100% accuracy.

LABORATORY

CONTENT OUTLINE

1. Motor demonstrations
2. Experiments with different types

CONTE

R Y

pes

S C I E N C E

CONTENT OUTLINE

1. Principles of elec. motor operation
    - 1.1 windings
    - 1.2 polarity
    - 1.3 commutator
    - 1.4 armature
2. Motors
    - 2.1 Shunt DC
    - 2.2 Series DC
    - 2.3 Compound DC motors
    - 2.4 Motor starting circ.
    - 2.5 Speed control
    - 2.6 Universal
    - 2.7 Induction-single phase-three phase-repulsion
    - 2.8 Shaded pols

MATHEMATICS

CONTENT OUTLINE

1. Linear functions and relations
    - 1.1 Slope
    - 1.2 Direct variation
    - 1.3 Ratio and proportion
2. Quadratic functions and relations
    - 2.1 Parabola
    - 2.2 Circle
    - 2.3 Eclipse
    - 2.4 Hyperbola
3. Problems - direct and inverse variation

CONTENT O

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COMMUNICATIONS

CONTENT OUTLINE

1. Written communication
    - 1.1 Letters of application
    - 1.2 Business letters
    - 1.3 Job descriptions
2. Reading
    - 2.1 Critical analysis
    - 2.2 Comprehension
    - 2.3 Poetry
3. Oral communication
    - 3.1 Scientific reports
    - 3.2 Panel discussions
    - 3.3 Class discussions on subjects of interest
4. Creative interpretation
5. Spelling
6. Vocabulary

LABORATORY

STUDENT ACTIVITIES

1. Do experiences in work book, building and testing motors.
2. Draw control circuits and make connections.
3. Devise simulated control circuits using timers, counters.
4. Limit switches and photo cells.

STUDEN

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4.

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make connections.

ircuits using timers,

ells.

SCIENCE

STUDENT ACTIVITIES

1. Observe demonstrations and see film.
2. Make schematic diagrams.
3. Compute motor load currents.
4. Draw motor control circuits.

MATHEMATICS

STUDENT ACTIVITIES

1. Construct graphs of linear and quadratic functions.
2. View filmstrip of linear relations and functions.
3. View filmstrip of quadratic relations and functions.
4. Write solutions to problems involving direct and inverse variation.
5. Derive solutions algebraically of quadratic systems of equations.

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COMMUNICATIONS

STUDENT ACTIVITIES

1. Write letters of application.
2. Write business letters.
3. Write job descriptions.
4. Read assigned novel (class) which will be discussed inclass from varying aspects: plot, characters, point-of-view, structure, style, theme, etc. Will write personal evaluation of book according to standards of excellence accepted by the class from experience and from authorities.
5. Read from Action series and answer questions on selection. (Attain a consistent 90%).
6. Make oral reports on lab work.
7. A picture will be selected from Stop, Look, Write book and discussed. A checklist or guideline for evaluation will be set up by class. Individuals will then write descriptions. Later, descriptions or interpretations will be written before discussions.

LABORATORY

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MATHEMATICS

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WAYS OF EVA

Unit 9

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COMMUNICATIONS

8. A number of poems will be read and discussed by the class. Then students will give interpretations of assigned poems stating reasons that can be determined within the structure of the poem. Each student will talk with teacher about his interpretation.
9. Spell from dictation.
10. Define in writing electrical terms.

WAYS OF EVALUATING OBJECTIVES

Unit 9

Write a letter of application

Write critical review of three short works of one writer.

Take comprehension test

Make lab reports

Write a description

Interpret three poems with same theme

Spelling tests

Vocabulary tests

LABORATORY	
	TEA
	TR

ORY	SCIENCE
	TEACHER ACTIVITIES 1. Show film 2. Example problems **TRAINING AIDS** Blackboard Projector - film AC and DC motors and push buttons

UNIT 10

INSTRUMENTS AND MEASUREMENTS

416

LABORATORY

UNIT 10 INSTRUMENTS AND MEASUREMENTS

OBJECTIVES

Students will be able to:

1. Observe meter movement and application.
2. Use current transformer and shunt type instruments.
3. Calibrate instruments.

UNIT 10 I

OBJECTIVE

Stud

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ication.

nt type

S C I E N C E

UNIT 10 INSTRUMENTS AND MEASUREMENTS

OBJECTIVES

Students will be able to:

1. Study basic meter movement and construction.

MATHEMATICS

UNIT 10 INSTRUMENTS AND MEASUREMENTS

OBJECTIVES

Students will be able to:

1. Derive logarithms of values of products and quotients of trigonometric functions.
2. Determine reference angles.
3. Resolve vectors.

UNIT 10 INSTRUM

OBJECTIVES

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1. Devel
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2. Write
   latio
   descr
   indiv
3. Write
   pictu
   guide
4. Recog
   news
   and l
5. Inter
   by gi
   opini
6. Write

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C O M M U N I C A T I O N S

UNIT 10 INSTRUMENTS AND MEASUREMENTS

OBJECTIVES

Students will be able to:

1. Develop a well-organized five paragraph composition following prescribed guidelines.
2. Write Haiku poetry by reducing prose translation of Japanese Haiku or from idea in prose descriptions selected by the teacher to an individual interpretation.
3. Write a narrative suggested by response to a picture. Evaluation will be by prescribed guideline.
4. Recognize propaganda by comparing the same news item in a recognized conservative, moderate, and liberal newspaper or magazine.
5. Interpret a quotation or controversial statement by giving sufficient support to uphold personal opinion.
6. Write 100 of 225 demon words (already studied)

L A B O R A T O R Y

CONTENT OUTLINE

1. Basic meter
2. Ammeters, voltmeters, Ohmmeters
3. AC meters
4. Circuit loading

Y

rs

SCIENCE

CONTENT OUTLINE

1. Basic meter movement
2. Ammeter
3. Voltmeter
4. Ohmmeter
5. Wheatstone bridge
6. Iron Vane meter movement
7. Wattmeter
8. AC meters

MATHEMATICS

CONTENT OUTLINE

1. Trigonometry
    1.1 Logarithms of trigonometric functions
    1.2 Reference angles
2. Vectors
    2.1 Add vectors
    2.2 Resolve vectors

7.

CONTENT OU

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s

COMMUNICATIONS

with 90% accuracy.

7. Write assigned electricial terms in chapter with 100% accuracy.

CONTENT OUTLINE

nctions

1. Writing
    - 1.1 Five paragraph composition
    - 1.2 Haiku poetry
    - 1.3 Interpretation of picture
    - 1.4 Opinion paper based on interpretation of quotation
2. Reading
    - 2.1 Propaganda
3. Listening
    - 3.1 Response after hearing tape
4. Spelling
5. Vocabulary

L A B O R A T O R Y

STUDENT ACITIVITES

1. Use work book and work Kit to experiment with instrumentation.

STUDENT

1.

2.

RY	SCIENCE
o experiment	STUDENT ACTIVITIES 1. Study this chapter 2. Observe demonstration

STUDENT ACTIVITIES

1. Use logarithms tables of trigonometric functions.
2. Solve problems concerning angles and vectors.

STUD

C S

ometric functions.

s and vectors.

COMMUNICATIONS

STUDENT ACTIVITIES

1. Write a five paragraph paper. Subjects may be from science class or from some interest area. Subjects will be determined in class by the students. Papers will be presented to the class orally.
2. Write Haiku poetry after reading some poems and studying the structure. Teacher will give ideas in prose descriptions. Later students will express own ideas and emotions in this short verse form.
3. Picture suggesting action of some kind between people will be shown to class. Students will write a short narrative suggested by the picture. Here students will have review of punctuation in use of quotation marks. These will be read to class and interpretation will be evaluated by class.
4. Comparison of newspapers to show propaganda and slanting will be done by listing phrases and

LABORATORY	

SCIENCE

MATHEMATICS

words t

5. Given a
student
his own

6. Write s

7. Write w

WAYS OF EVALUATIN

Unit 10

Vocabulary t

Written and

1. on

2. on

Discussions

1. on

2. on

3. on

Write five n

Write Raiku

Write a narr

words that show attitude.

5. Given a quotation or controversial statement, student will write a paper in which he supports his own opinion.
6. Write spelling words from dictation.
7. Write vocabulary word in sentences.

WAYS OF EVALUATING OBJECTIVES

Unit 10

Vocabulary tests

Written and oral reports
  1. on current experiment
  2. on technical readings

Discussions (oral)
  1. on electricity project
  2. on general reading matter
  3. on subjects of general interest

Write five paragraph paper

Write Raiku poetry

117 Write a narrative (one page long)

L A B O R A T O R Y

TEACHER AC

Demons

TRAINING AI

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	SCIENCE
	TEACHER ACITVITIES Demonstrations TRAINING AIDS Work Kit and Instruments

MATHEMATICS	
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COMMUNICATIONS

Write a paper describing what propaganda is and how and why it is used.

Write an opinion paper.

Spelling tests

Vocabulary tests

WAYS OF EVALUATING OBJECTIVES

MATERIALS

LABORATORY	
WAYS OF EVALUATING OBJECTIVES	WAYS OF EVA
Students will be evaluated on performance of the unit objectives. Extra credit may be obtained by doing extra work projects.	S in cla forman

RY	SCIENCE
	WAYS OF EVALUATING OBJECTIVES
performance dit may be cts.	Students will be evaluated by observation in class, class discussion, homework and performance on written tests.

MATHEMATICS	
WAYS OF EVALUATING OBJECTIVES	WAYS OF EV
Students will be evaluated by observation in class, class discussion, homework and performance on written tests.	Liste

	C O M M U N I C A T I O N S
	WAYS OF EVALUATING OBJECTIVES
rvation in class, nce on	Listed at the end of each unit.

LABORATORY

MATERIALS

Film

Recorders

Meters

Electricity & Electronics

Howard H. Gerrish

Physics Workbook

Henry Holt

Overlays & overhead projectors

RY	SCIENCE

MATHEMATICS

MATERIALS

Textbook: Nunz and Shaw *Electronics Mathematics*.

McGraw Hill Book Company, 1967.

Simple computer

Desk calculator

Game - Battleship

Slide rulers

Compasses

Protractors

Rulers

Detachable models of sphere

Films

Filmstrips

Tapes for reading machines

Overlays for overhead projector.

MAT

C S	COMMUNICATIONS
ics Mathematics.	MATERIALS Enjoying English (Singer) Adventures for Americans (Harcourt, Brace, & World) English 2600 (Harcourt, Brace, & World) Be A Better Reader (Prentice-Hall) Paperbacks Magazines Newspapers Games: Scrabble, Abaca Action (Series by Houghton, Miflin) Impact (Series by Holt, Winston, Rinehart) Overlays for overhead projector Films Filmstrips

14383

FAIRFIELD HIGH SC

ED058408

VOCATIONAL INTERDISCI

June, 1971

HIGH SCHOOL

TERDISCIPLINARY I PROGRAM

Demonstration Programs
of
Vocational Education
in
South Carolina Region V
BAVTE/DVTE Project No. 0-361-0006
Contract No. OEC-0-70-5190(361)

The Fairfield High School

Vocational Interdisciplinary Program

ED058408

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
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11th Grade

Team Members:

Eugene E. Martin -Mathematics

Malcolm J. Skipper -Electronics

Audrey F. Henry -English

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The Over-all Objectives of the Course of Fairfield High School's Vocational Interdisciplinary Program of Study

To help students:

1. Succeed by working with them in a program that will benefit them.
2. Improve school attendance.
3. Improve their level of achievement.
4. Improve their attitude, outlook on life, and character.
5. Improve their grades.
6. Grow in intellectual curiosity and in the capacity to think critically.
7. Make an effective use of language in the daily affairs of life.
8. Enjoy school.
9. Gain a competent use of language and reading for vocational purposes.
10. Gain faith in and allegiance to the basic values of a democratic society.
11. Gain an habitual and intellectual use of the mass mediums of communication.

GENERAL OBJECTIVES

LABORATORY	
GENERAL OBJECTIVES	GENERAL OBJE
1. To develop **physical science concepts** with the application to electronics. 2. To develop manipulative skills with safe work habits. 3. To present a variety of electronic experiments and problems to the student in order to develop his ability to cope with practical problems he will encounter in industry. 4. To develop in each student the desire for continued study and growth.	

	SCIENCE
	GENERAL OBJECTIVES
ncepts with the with safe work onic experiments order to th practical industry. desire for	

MATHEMATICS

GENERAL OBJECTIVES

The aims of this course are to prove a sound theoretical background for a student in basic electronics. In order to give the reflexive experience necessary to attain the aims, each unit is purposely built upon and often overlapping the preceding unit. This is deemed fruitful in that recalling previous mathematical experiences are often necessary for proficiency in mathematical computations.

To keep the student in school and get him ready for the world of work or higher learning are also important goals.

TEXTBOOKS AND REFERENCE BOOKS

Brown, Kenneth, General Mathematics. Atlanta: Laidlaw Brothers

Graham, Frank; Audels Handy Book of Practical Electricity.
New York: Audel and Co.

Slade, Samuel; Mathematics for Technical and Vocational Schools. New York: John Wiley and Sons, Inc.

GENERAL OBJECTIV

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TEXTBOOKS AND RE

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and Vocational
Wiley and Sons, Inc.

COMMUNICATIONS

GENERAL OBJECTIVES

The aims of this course are to improve writing skills through studying sentence structure, to increase the students' vocabulary, and to give the students a general overview of the methods used in research and reporting.

TEXTBOOKS AND REFERENCE BOOKS

Aurner, A., Effective English for Business.
Dallas: South-Western Publishing Co.

Hedde, B., The New American Speech.
New York: J. B. Lippincott Company

Stewart, L., Business English and Communication.
New York: McGraw-Hill Book Company

UNIT 1

ORIENTATION AND INTRODUCTION

LABORATORY

UNIT 1 ORIENTATION AND INTRODUCTION

OBJECTIVES

1. Students should have a baisc understanding about the course.
2. Students should know what is expected of him and what to expect from the course.
3. Students will be aware of the job opportunities in this area.

OUTLINE

A. What course is about

B. What we expect to accomplish

C. What this will mean to student

D. Job opportunities

UNIT 1 ORIENT

	S C I E N C E
	UNIT 1 ORIENTATION AND INTRODUCTION
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MATHEMATICS

UNIT 1: ORIENTATION AND INTRODUCTION

OBJECTIVES

1. Students will be able to apply the fundamental operations of addition, subtraction, multiplication and division.
2. Students will be able to perform everyday problems and solutions.

OUTLINE

A. Addition

B. Subtraction

C. Multiplication

D. Division

UNIT 1 ORIENTATI

OBJECTIVES

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4. Studen
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5. Studen
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OUTLINE

A. Course
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2. Co
B. Formul

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everyday

COMMUNICATIONS

UNIT 1 ORIENTATION AND INTRODUCTION

OBJECTIVES

1. Students will know the purpose of the interdisciplinary program.
2. Students will be aware of their own communications weaknesses through pre-tests in sentence and paragraph writing, spelling, and vocabulary.
3. Students will be able to verbalize personal achievement goals for the communications course.
4. Students will be able to explain the value of good communications skills in a working situation.
5. Students will be aware of the available printed materials about electronics.

OUTLINE

A. Course objectives
   1. General
   2. Communications

B. Formulation of individual student goals for the

LABORATORY	
E. What is expected of student	

LEARNING ACTIVITIES

1. Lecture
2. Question and answer period

Y	SCIENCE
7	

M A T H E M A T I C S

E. Simple algebraic equations

LEARNING ACTIVITIES

1. Pre-test (algorisms of the four fundamental operations)
2. Pull-apart figures to illustrate fractions
3. Drawings to show miltiplication, addition of fractions
4. The following methods are to be used:
    a) Discussion
    b) Experiments
    c) Questionnaires
    d) Everyday math problems

course

C. Study

D. Value

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E. Introdu

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3. Ma

LEARNING ACTIVIT

1. Pretest
    a) Se
    b) Pa
    c) Sp
    d) Vo
2. Class
3. Discus
4. Study

commun

a) fi

b) li

course

C. Study habits and skills

D. Value of good communications skills in work situations

E. Introduction to abailable printed materials

  1. Books
  2. Pamphlets
  3. Magazines

LEARNING ACTIVITIES

1. Pretests

   a) Sentence writing

   b) Paragraph writing

   c) Spelling

   d) Vocabulary

2. Class discussion of study habits

3. Discussion of writing standards

4. Study of successful people who have overcome communications handicaps.

   a) films

   b) literature

ons

on

L A B O R A T O R Y

S C I E N C E

MATHEMATICS	
	5. Trip t

	COMMUNICATIONS
	5. Trip to library to see available materials

UNIT 2

LABORATORY SAFETY PROCEDURES AND TECHNIQUES

UNIT 2 LABORATORY SAFETY PROCEDURES AND TECHNIQUES

OBJECTIVES

1. Students should realize the need for certain lab procedures - how they affect his personal well being and the well being of his fellow students.
2. Students should be able to identify and explain the proper use of the various hand tools available in the lab.
3. Students will become familiar with the various functions of the lab console power supplies and meters and demonstrate their use by performing his experiments with safety and accuracy.
4. Students will demonstrate the function of the various instruments and use them in his experiments.

OUTLINE

A. Safety is electrical lab

B. Use of hand tools

UNIT 2 LAB

	S C I E N C E
UES	UNIT 2 LABORATORY SAFETY PROCEDURES AND TECHNIQUES
certain personal fellow nd ex- and e various pplies and erforming acy. n of the is ex-	

MATHEMATICS

UNIT 2 LABORATORY SAFETY PROCEDURES AND TECHNIQUES

OBJECTIVES

1. Students will be able to apply the proper use of measureing instruments.
2. Students will be able to use his ability to count, to measure, and to use symbols that stand for collections and amounts.

OUTLINE

A. Linear measurement (English and metric)

B. Accuracy

UNIT 2 LABORAT

OBJECTIVES

1. Stud
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OUTLINE

A. Proc

B. Form

COMMUNICATIONS

UNIT 2 LABORATORY SAFETY PROCEDURES AND TECHNIQUES

OBJECTIVES

1. Students will demonstrate the ability to take notes in reading and listening situations.
2. Students will distinguish between various kinds of writing:
   a. short fiction
   b. newspaper articles
   c. technical reports
3. Students will write reports on technical magazine or newspaper articles.
4. Students will show the ability to look up meanings and derivations of technical words in the dictionary.
5. Students will demonstrate in writing the ability to spell names of pieces of laboratory equipment.

OUTLINE

A. Procedures in note taking
B. Form of types of writing

LABORATORY

C. Use of console

D. Use of meters

E. Basic construction techniques

LEARNING ACTIVITIES

1. Lecture
2. Demonstration
3. Adjusting and using actual equipment

Y	SCIENCE
ipment	

MATHEMATICS

C. Greatest possible error

D. Relative error

E. Calipers

  1. Vernier
  2. Micrometer

F. Measurement

  1. Linear
  2. Area
  3. Volume

LEARNING ACTIVITIES

1. Use the following:

   Protractors, rulers, and compasses for constructing angles on chalkboard and desk work.

2. The following methods to be used in problem solving:

   a) Discussions

   b) Questionnaires

   c) Job math problems

   d) Sales and tax problems

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LEARNING A

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roblem solving:

COMMUNICATIONS

1. short fiction
2. Articles (newspaper and magazine)
3. technical reports

C. Writing standards for technical reports

D. Use of Dictionary

E. Spelling of names of laboratory equipment

LEARNING ACTIVITIES

1. Write paragraphs on safety
2. Give oral reports on safety
3. Read literature on the machine and safety
4. Write reports on articles from electronics magazines
5. Use the dictionary to find the meanings and derivations of technical terms
6. Spell names of laboratory equipment

LABORATORY

Y	SCIENCE

MATHEMATICS	
e) Pre-test on measuring instruments	

480

COMMUNICATIONS

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UNIT 3

FUNDAMENTALS OF ELECTRICITY

UNIT 3 FUNDAMENTALS OF ELECTRICITY

UNIT 3 FUNDAMENTALS O

OBJECTIVES

1. The student should be able to understand the composition of matter and be familiar with the basic atomic theory.
2. The student will demonstrate how the composition of matter determines whether it is an insulator or conductor of electrons.
3. The student will demonstrate the difference between voltage, current, and resistance and explain their interdependence on each other when they comprise a circuit.

OUTLINE

A. Composition of matter
B. The Atom
C. Static charges
D. Conductor and insulators
E. Voltage
F. Current

	SCIENCE
	UNIT 3 FUNDAMENTALS OF ELECTRICITY
and the with composition insulator erence be- e and other	

MATHEMATICS

UNIT 3 FUNDAMENTALS OF ELECTRICITY

OBJECTIVES

1. Students will be able to solve algebraic equations.
2. Students will be able to apply algebraic problems in everyday living.

OUTLINE

- A. Weight of materials
- B. Additional use of positive and negative numbers
- C. Equations containing positive and negative numbers
- D. Ohm's Law

UNIT 3 FUNDAME

OBJECTIVES

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   open
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4. Stud
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OUTLINE

- A. Sim
- B. Sent
- C. Sent
- D. Hist a
  elec
- E. Tech

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	UNIT 3 FUNDAMENTALS OF ELECTRICITY
algebraic algebraic negative and	OBJECTIVES 1. Students will show their ability to write complete sentences. 2. Students will employ a variety of sentence openers in their written reports. 3. Students will write interesting varied sentences. 4. Students will know historical facts about men who have been prominent in the field of electronics. (e.g. George Simon Ohm) OUTLINE A. Simple sentences B. Sentence openers C. Sentence variety D. Historical figures who have contributed to electronics E. Technical terminology

LABORATORY

G. Resistance

H. Power

LEARNING ACTIVITIES

1. Lecture
2. Demonstration
3. Performing experiments in work book
4. Question and answer period

SCIENCE

MATHEMATICS

E. Rate and measuring problems

LEARNING ACTIVITIES

1. Pre-test on rates and measuring problems
2. Charts, maps, protractors, pulleys, and thermometers and gauges that illustrate the integers
3. In order to develop the ability of the students and give him a growing interest in his related subjects the following methods or procedures will be used:
    a) Class discussions
    b) Questionnaires
    c) Demonstrations
    d) Experiments and daily related subject problems

C O

LEARNING ACTIVITIES

1. Analyzing
2. Discussin
3. Constructi
4. Writing re
5. Spelling t

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COMMUNICATIONS

LEARNING ACTIVITIES

1. Analyzing simple sentences
2. Discussing sentence elements
3. Constructing simple sentences
4. Writing reports on historical figures
5. Spelling technical terms

UNIT 4

SIMPLE CIRCUITS

491

LABORATORY

UNIT 4 SIMPLE CIRCUITS

UNIT 4 S

OBJECTIVES

Students will be able to:

1. Identify components by their physical appearance and be able to draw and identify their schematic symbol.
2. Demonstrate a good understanding of the Ohm's Law formulas for the various circuits components and demonstrate their use by computing voltage, current and resistance values in a circuit and prove his computation by voltmeters and ammeter readings.
3. Demonstrate with meters and reinforce with compulation that:
    - A. Voltage is additive in series.
    - B. Current is the same in all parts of a series circuit.
    - C. Resistance is additive in series.
    - D. That the sum of all the voltage drops around a circuit equals the applied voltage.

	S C I E N C E
	UNIT 4 SIMPLE CIRCUITS

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their schematic

of the Ohm's Law

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ers and ammeter

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voltage.

24

MATHEMATICS

UNIT 4 SIMPLE CIRCUITS

OBJECTIVES

Students will be able to:

1. Use short cuts in handling very large numbers.
2. Use scientific notation.
3. Raise to powers and extract roots.
4. Use logarithms.

UNIT 4 SIMPLE C

OBJECTIVES

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corre
5. Read

COMMUNICATIONS

UNIT 4 SIMPLE CIRCUITS

OBJECTIVES

Students will be able to:

1. Recognize compound sentences and compose their own.
2. Clearly explain simple circuits orally.
3. Use co-ordinate conjunctions correctly.
4. Punctuate simple and compound sentences correctly.
5. Read and write essays.

4. Demonstrate in parallel circuits
   - A. How to calculate R_t using three different formula
   - B. That increasing the number of resistors decreases the total resistance
   - C. That voltage is equal in a parts of a parallel circuit
   - D. That current is additive in parallel circuits
5. Demonstrate how voltage and current are distributed in a complex circuit and calculate by applying lessons learned previously the various properties of the circuit

OUTLINE

A. Components and symbols

B. Ohm's law

C. Series circuits

D. Parallel circuits

E. Combination circuits

F. Voltage dividers

G. Switches and switching circuits

	SCIENCE
ee different resistors e rts of a arallel circuits nt are distri- lculate by ly the verious	

MATHEMATICS

OUTLINE

- A. Equations with fractional coefficients
- B. Scientific notation
- C. Ohm's Law

OUTLINE

- A. Compoun
- B. Oral re
- C. Co-ordi
- D. Punctua
- E. Essays
  - 1. lit
  - 2. wri

COMMUNICATIONS

OUTLINE

nts

- A. Compound sentences
- B. Oral reports
- C. Co-ordinate conjunctions
- D. Punctuation of simple and compound sentences
- E. Essays
  - 1. literature
  - 2. writing

LABORATORY

LEARNING ACTIVITIES

1. Lecture
2. Demonstration
3. Discussion
4. Experiments in workbooks
5. Lab work

SCIENCE

MATHEMATICS

LEARNING ACTIVITIES

1. Logarithms as needed
2. Use slide rule
3. Computations involving scientific notation

LEARNING ACTIVITI

1. Analyzi
2. Punctua
3. Study o
4. Library
5. Writing

COMMUNICATIONS

n

LEARNING ACTIVITIES

1. Analyzing compound sentences
2. Punctuation drills on compound sentences
3. Study of essays in literature
4. Library work on essays
5. Writing essays

UNIT 5

MAGNETISM

OBJECTIVES

Students will be able to demonstrate or explain:

1. Properties of permanent magnets.
2. That magnets are surrounded by invisible magnetic fields and by the use of filings show that lines of force emerge from one pole of the magnet, pass through surrounding space and enter the other pole of the magnet.
3. The effect that current has on the magnetic field produced by current flow through a wire; the effect of an iron core and their current carring conductor, and using the iron filings technique determine the direction and shape of the magnetic field.
4. That the magetomotive force establishing lines of magnetic flux is proportional to ampere-turns of the coil.
5. That the resistance offered to the flow of magnetic

RY	SCIENCE
	UNIT 5 MAGNETISM
rate or explain: nets. by invisible use of filings show from one pole of rrounding space and magnet. on the magnetic field rough a wire; the their current carring on filings technique shape of the magnetic e establishing lines ional to ampere-turns to the flow of magnetic	

MATHEMATICS

UNIT 5 MAGNETISM

OBJECTIVES

Students will be able to:

1. Change one unit of measurement to another.
2. Determine capacity of wires.

UNIT 5 MAGNETISM

OBJECTIVES

Students will

1. Recognize
   own.
2. Verbalize
   ciples of
3. Use subor
4. Punctuate
5. Know the
   on simple

COMMUNICATIONS

UNIT 5 MAGNETISM

OBJECTIVES

Students will be able to:

1. Recognize complex sentences and compose their own.
2. Verbalize, both orally and in writing, principles of magnetism.
3. Use subordinate conjunctions correctly.
4. Punctuate complex sentences correctly.
5. Know the technical vocabulary needed for units on simple circuits and magnetism.

flux depends upon the material forming the magnetic path and that the resistance to flux flow of iron is very low compared to air.

6. That magnetic lines of flux pass with ease through non-magnetic substances, such as glass, as if the substance were not there at all.

OUTLINE

A. Permanent magnets

B. Electro magnets

C. Electro magnetic circuits

1. relays
2. solenoids
3. circuit breakers

LEARNING ACTIVITIES

1. Lecture
2. Demonstration
3. Discussion
4. Experiments in workbooks
5. Lab work

Y	SCIENCE
al forming the esistance to flux pared to air. pass with ease ces, such as glass, there at all.	

MATHEMATICS

OUTLINE

- A. Applications
- B. Measurements of
  - 1. Wire gauges
  - 2. Wire grades (net also)
  - 3. Wire capacity
- C. Review Ohm's Law
- D. Numerical trigonometry

LEARNING ACTIVITIES

1. Checking wire with gauges and the application of Ohm's Law.
2. Work problems on Ohm's Law.

OUTLINE

A.

B.

C.

D.

E.

LEARNIN

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COMMUNICATIONS

OUTLINE

A. Complex sentences

B. Reports on magnetism

C. Subordinate conjunctions

D. Punctuation of complex sentences

E. Technical vocabulary

LEARNING ACTIVITIES

plica-

1. Analyzing complex sentences
2. Punctuation drills on complex sentences
3. Oral and written reports on aspects of magnetism
4. Written exercises on technical vocabulary
5. Discussing historical figures related to the study of magnetism

UNIT 6

METERS

LABORATORY

UNIT 6 METERS

UNIT 6

OBJECTIVES

Students will be able to:

1. Demonstrate by computation and actual construction how to design Ohmmeters, voltmeters, and ammeters.
2. Demonstrate the use of various meters and explain the precautions necessary when using each different type of meters.

OUTLINE

A. Voltmeter

B. Ammeters

C. Ohmmeter

Y	SCIENCE
	UNIT 6 METERS
nd actual hmmeters, volt- us meters and ssary when using s.	

MATHEMATICS

UNIT 6 METERS

OBJECTIVES

Students will be able to:

1. Use Ohm's Law
2. Read electrical meters

OUTLINE

- A. Algebraic operations
- B. Ohm's Law
- C. Electrical measurements
  1. Ohm
  2. Volt
  3. Amphere
  4. Watts

UNIT 6

OBJECTI

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OUTLINE

A.

B.

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C O M M U N I C A T I O N S

UNIT 6 METERS

OBJECTIVES

Students will be able to:

1. Recognize compound-complex sentences and compose their own.
2. Write business letters of various kinds:
   - a) application
   - b) adjustment
   - c) opinion
   - d) request
3. Know the derivation and history of the terms ohm, volt, and ampere.

OUTLINE

A. Compound-complex sentences

B. Business letters
   1. application
   2. adjustment
   3. opinion
   4. request

LEARNING ACTIVITIES

1. Lecture
2. Demonstration
3. Discussion
4. Experiments in workbooks
5. Lab work

SCIENCE

MATHEMATICS

LEARNING ACTIVITIES

1. Meter reading
2. Simple graphing
3. Graphing AC durrent

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C. Derivation and history of terms

1. Ohm
2. volt
3. amphere

LEARNING ACTIVITIES

1. Analyzing compound-complex sentences
2. Composing compound-complex sentences
3. Writing business letters
4. Addressing envelopes for business letters
5. Writing and mailing letters of opinion and letters of request
6. Studying letters of opinion which have appeared in regional newspapers or in news magazines
7. Dictionary work in library on Ohm, volt, and ampere.

UNIT 7

ALTERNATING CURRENT FUNDAMENTALS

LABORATORY

UNIT 7 ALTERNATING CURRENT FUNDAMENTALS

OBJECTIVES

Students will be able to:

1. Demonstrate by computation and measurement with meters:
   - A. The comparison of direct current and RMS (effective) values of alternating current.
   - B. The peak, average, and effective values of alternating current.
2. Demonstrate the use of the oscilloscope to display the waveforms of AC and pulsating DC.

OUTLINE

A. Alternator theory

B. Alternating current values

C. Measuring alternating current

D. Use of Oscilloscope

	SCIENCE
	UNIT 7 ALTERNATING CURRENT FUNDAMENTALS
measure- rrent and lternating ctive values of lloscope to pulsating DC.	

MATHEMATICS

UNIT 7 ALTERNATING CURRENT FUNDAMENTALS

OBJECTIVES

Students will be able to:

1. Measure AC current.
2. Get acquainted with the nature of currents.

OUTLINE

A. Measuring alternating currents
B. Calculating capacity of step-up and step-down transformers

UNIT 7 ALTE

OBJECTIVES

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OUTLINE

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C. R
D. S

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C O M M U N I C A T I O N S

UNIT 7 ALTERNATING CURRENT FUNDAMENTALS

OBJECTIVES

Students will be able to:

1. Understand the principles of subject-verb agreement and will write correct sentences illustrating correct usage.
2. Recognize sentence fragments and will not use them in writing.
3. Recognize run-on sentences and will not use them in writing.
4. Discover the enjoyment of reading short stories by well-known American authors.
5. Verbalize the function of transformers and the fundamentals of alternating currents.

OUTLINE

A. Subject-verb agreement

B. Sentence fragments

C. Run-on sentences

D. Short Stories

LABORATORY

LEARNING ACTIVITIES

1. Lecture
2. Classwork
3. Performing experiments in Lab
4. Discussion

TORY	SCIENCE
n Lab	

LEARNING ACTIVITIES

1. Solve problems by use of equations.
2. Additional graphing as needed.
3. Solve simultaneous equations.

1. O. Henry
2. William Faulkner
3. James Thurber
4. Ernest Hemingway
5. Stephen Vincent Benet
6. Others

E. Reports on transformers and alternating currents.

LEARNING ACTIVITIES

1. Studying sentences with correct subject-verb agreement
2. Composing sentences with correct subject-verb agreement
3. Changing sentence fragments to complete sentences
4. Revising run-on sentences
5. Reading short stories
6. Searching for interesting short stories in library
7. Listening to short stories on record
8. Writing reports on transformers and alternating currents

UNIT 8

LAWS AND PROPERTIES OF INDUCTORS

L A B O R A T O R Y

UNIT 8 LAWS AND PROPERTIES OF INDUCTORS

UNIT

OBJECTIVES

Students will demonstrate

1. Effects of inductance in dc and ac circuits
2. The high counter emf developed in a inductance when the current is interrupted
3. That when the dc current has reached a steady value, the inductance has no effect on current flow other than the inductors ohmic resistance.
4. Construction of a simple double wound transformer with an open core.
5. The significance of the voltage vs turns ratio of a transformer.
6. That INDUCTIVE REACTANCE (X_L) is the opposition offered to the flow of ac current in a circuit containing inductance and that it is measured in ohms.
7. That impedence (Z) is the opposition offered to AC current flow in a circuit containing both inductance and resistance and Z is also

	SCIENCE
	UNIT 8 LAWS AND PROPERTIES OF INDUCTORS
ircuits inductance a steady on current resistance. d transformer urns ratio opposition a circuit measured offered to ing both lso	

MATHEMATICS

UNIT 8 LAWS AND PROPERTIES OF INDUCTORS

OBJECTIVES

Students will be able to enrich their knowledge of theory electricity.

C

UNIT 8 LAWS AND PRO

OBJECTIVES

Students will

1. Capitali
2. Use peri
   quotatio
3. Explain
   of induc

edge

COMMUNICATIONS

UNIT 8 LAWS AND PROPERTIES OF INDUCTORS

OBJECTIVES

Students will be able to:

1. Capitalize reports and sentences correctly.
2. Use periods, commas, apostrophes, and quotation marks correctly.
3. Explain in writing the laws and properties of inductors.

measured in ohms.

8. That the phase angle between voltage and current depends on the magnitude of X_L in circuit.

OUTLINE

A. Theory of Inductance
B. Series and Parallel combinations
C. Inductive Reactance
D. Mutual Inductance
E. Transformers

LEARNING ACTIVITIES

1. Lecture
2. Classwork
3. Performing experiments in Lab
4. Discussion

	SCIENCE
and L	

MATHEMATICS

OUTLINE

A. Measurement of E. M. F.

B. Measurement of induced currents

C. Formulas for electricity

LEARNING ACTIVITIES

1. Investigate circuits
2. Series circuits
3. Parallel circuits
4. Series-Parallel combinations

OUTLINE

A. Cap

B. End

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3.

C. Comm

D. Apos

E. Quot

F. Repo

LEARNING ACTIV

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3. Usi

OUTLINE

- A. Capitalization
- B. End punctuation
  - 1. period
  - 2. question mark
  - 3. exclamation mark
- C. Commas
- D. Apostrophe
- E. Quotation marks
- F. Reports on inductors

LEARNING ACTIVITIES

1. Studying examples of correct capitalization in electronics text book
2. Practice work on capitalizing words in sentences
3. Using film strips on correct use of periods,

LABORATORY	

SCIENCE

MATHEMATICS	C
	commas, a 4. Practice 5. Writing r principle punctuati

COMMUNICATIONS

commas, apostrophes, and quotation marks

4. Practice work on using correct punctuation
5. Writing reports on inductors in which all the principles of correct capitalization and punctuation are observed

UNIT 9

LAWS AND PROPERTIES OF CAPACITORS

LABORATORY

UNIT 9 LAWS AND PROPERTIES OF CAPACITORS

UNIT 9 LAWS AN

OBJECTIVES

Students will demonstrate:

1. That capacitors will pass ac and block dc.
2. That capacitors connected to a DC source of voltage will charge up to the value of the applied voltage.
3. That charged capacitors are voltage sources capable of giving an electrical shock.
4. That the direction of charge and discharge currents are opposite in polarity.
5. That the time it takes for a capacitor to charge up is dependent upon the RC product in seconds, where R is in ohms and C is in farads.
6. That X_C is the opposition offered to alternating current by a capacitor measured in ohms.
7. That Z is the opposition offered by a capacitor and resistor in a circuit measured in ohms.

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	UNIT 9 LAWS AND PROPERTIES OF CAPACITORS
ck dc. urce of of the sources k. charge or to roduct is in alter- ed in ohms. a capacitor n ohms.	

MATHEMATICS	
UNIT 9 LAWS AND PROPERTIES OF CAPACITORS	UNIT 9 LAWS AN
OBJECTIVES Students will be able to: 1. Graph sine wave 2. Understand phasors 3. Use rectangular and Polar coordinates	OBJECTIVES Students w 1. Use c and p 2. Write 3. Spell with

C S

inates

COMMUNICATIONS

UNIT 9 LAWS AND PROPERTIES OF CAPACITORS

OBJECTIVES

Students will be able to:

1. Use colons, semi-colons, hyphens, dashes, and parentheses correctly.
2. Write a brief research paper.
3. Spell and define terminology associated with capacitors.

8. That the phase angle between voltage and current depends on the magnitude of X_C.

OUTLINE

A. Capacitor theory

B. R-C time

C. Capacitor action in DC circuits

D. Capacitor action in AC circuits

E. Capacitors in series and parallel

	SCIENCE
e and current	

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MATHEMATICS

OUTLINE

- A. Trigonometry
- B. Mathematics of the sine
- C. Review E. M. F.

OUTLINE

A. Punctuation marks
    1. colon
    2. semi-colon
    3. hyphen
    4. dash
    5. parentheses
B. Reaearch paper
    1. Choosing a topic
    2. Finding bibliographic resources
    3. Taking notes
    4. Writing rough draft
    5. Footnoting
    6. Writing a bibliography
    7. Writing the final copy
C. Terminology associated with capacitors

LABORATORY

LEARNING ACTIVITIES

1. Lecture
2. Classwork
3. Performing experiments in Lab
4. Discussion

SCIENCE

MATHEMATICS

LEARNING ACTIVITIES

1. Set up circuits
2. Parallel
3. Series
4. Combinations

LEARNING ACTIV

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   res
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   asso

ICS

COMMUNICATIONS

LEARNING ACTIVITIES

1. Drill work on colons, semi-colons, hyphens, dashes, and parentheses
2. Use of film strips to teach use of punctuation marks
3. Illustrations of changes in sentence meaning if correct punctuation marks are not used
4. Talk by librarian on resources available for research
5. Work in library on research papers
6. Film strips on writing research papers
7. Practice work on footnotes and bibliography entries
8. Written evaluation on knowledge of terminology associated with capacitors

UNIT 10

TUNED CIRCUITS

LABORATORY

UNIT 10 TUNED CIRCUITS

OBJECTIVES

Students will be able to demonstrate:

1. That resonance occurs when the X_L and X_C become equal.
2. That frequency of resonance (fo) = $\frac{1}{2\pi LC}$
3. The effects of varying the frequency of the applied voltage above and below resonance.
4. The importance of the Q of the circuit and how it is related to bandwidth and frequency discrimination.
5. That at series resonance, I_{line} is maximum, Z is minimum.
6. That at parallel resonance, Z is maximum and I_{line} is minimum.
7. That combinations of inductor and capacitors can be used to shunt unwanted AC voltages and pass desired AC voltages.

UNIT 10 TUNE

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X_L and X_C

o) = $\frac{1}{2\pi\ LC}$

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is maximum and

and capacitors

AC voltages and

S C I E N C E

UNIT 10 TUNED CIRCUITS

MATHEMATICS

UNIT 10 TUNED CIRCUITS

OBJECTIVES

Students will be able to:

1. Understand inductance
2. Understand complex circuits

UNIT 10 T

OBJECTIVE

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ICS	COMMUNICATIONS
	UNIT 10 TUNED CIRCUITS

OBJECTIVES

Students will be able to:

1. Recognize means of improving their vocabularies.
2. Know the meanings of prefixes, roots, and suffixes.
3. Use synonyms, antonyms, and homonyms as vocabulary builders.
4. Understand and appreciate the writing of modern American poets.

LABORATORY

OUTLINE

A. Resonance

B. Series resonance

C. Parallel resonance

D. Filter circuits

Y	SCIENCE

MATHEMATICS

OUTLINE

A. Algebra

B. Equations in two unknowns

C. Quadratic equations

OUTLINE

A.

B.

C.

D.

E.

F.

OUTLINE

A. Vocabulary building
    1. through wide reading
    2. through conscious study
    3. through puzzles and games

B. Attacking new words
    1. prefixes
    2. roots
    3. suffixes

C. Synonyms

D. Antonyms

E. Homonyms

F. American poets
    1. Robert Frost
    2. Carl Sandburg
    3. Emily Dickenson
    4. James Weldon Johnson
    5. Others

LABORATORY

LEARNING ACTIVITIES

1. Lecture
2. Classwork
3. Performing experiments in Lab
4. Discussion

SCIENCE

MATHEMATICS

LEARNING ACTIVITIES

1. Refresh trig operations
2. Refresh quadratics
3. Refresh equations - 3 unknowns

LEARNIN

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LEARNING ACTIVITIES

1. Discussion about value of large vocabulary
2. Discussion about means of vocabulary building
3. Work on crossword and other puzzles
4. Game day (Scrabble, etc.)
5. Written exercises with synonyms, antonyms, and homonyms.
6. Class dictionary work on vocabulary
7. Records of modern Americans reading their own poetry.

UNIT 11

POWER SUPPLIES

LABORATORY

UNIT 11 POWER SUPPLIES

OBJECTIVES

Student will be able to:

1. Construct and explain theory of operation of half wave, full wave, and bridge rectifier circuits - expounding on advantages and disadvantages of each.
2. Construct and explain theory of operation of the different type of filter circuits such as C input, L input and π type filters and demonstrate advantages and disadvantages of each.

OUTLINE

- A. Type
  1. half wave
  2. full wave
  3. bridge type
- B. Filter circuits

R Y	SCIENCE
	UNIT 11 POWER SUPPLIES
ry of operation nd bridge rectifier dvantages and ry of operation of er circuits nd π type filters and disadvantages	

MATHEMATICS

UNIT 11 POWER SUPPLIES

OBJECTIVES

Students will be able to:

1. Trouble - shoot (diagnose)
2. Do simple repairs

OUTLINE

A. Additional algebra

B. Laws of sines and cosines

UNIT 11 POWER

OBJECTIVES

Students

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4. Sum
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OUTLINE

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   2.

B. Tec

C. Dra

COMMUNICATIONS

UNIT 11 POWER SUPPLIES

OBJECTIVES

Students will be able to:

1. Understand the meaning of paraphrasing and will be able to paraphrase paragraphs and essays.
2. Write technical reports describing projects they have completed during the year.
3. Come to appreciate the literary form of the drama and will read a play by a modern American author.
4. Summarize achievements for the year in oral and written form.

OUTLINE

- A. Paraphrasing
  - 1. Reading and paraphrasing paragraphs
  - 2. Reading and paraphrasing essays
- B. Technical reports
- C. Drama

C. Regulation

LEARNING ACTIVITIES

1. Lecture
2. Classwork
3. Performing experiments in Lab
4. Discussion

Y	SCIENCE

MATHEMATICS

LEARNING ACTIVITIES

1. Disassemble motors
2. Rebuild motors

1.

2.

D. Year

LEARNING ACTIV

1. Prac
grap
2. Revi
3. Clas
4. Libr
the
a.
b.
c.
5. Oral

C S	COMMUNICATIONS

1. Characteristics of plays
2. Modern American playwrights

D. Year's summary

LEARNING ACTIVITIES

1. Practice in paraphrasing sentences and paragraphs
2. Review of requirements for technical reports
3. Class discussion of plays
4. Library work using encyclopedias to learn about the lives of playwrights.
    a. Eugene O'Neill
    b. Tennessee Williams
    c. Others
5. Oral discussion of years achievements

4383

CAMDEN HIGH SCH

ED058408

VOCATIONAL INTERDISCIPL

De

V

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BAVTE

Cont

June, 1971

IGH SCHOOL

ERDISCIPLINARY I PROGRAM

Demonstration Programs
of
Vocational Education
in
South Carolina Region V
BAVTE/DVTE Project No. 0-361-0006
Contract No. OEC-0-70-5190(361)

The Camden High School

Vocational Interdisciplinary Program

ED058408

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
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11th Grade

Team Members:

Samuel Eisenback	- Machine Technology
Rawson Calvin Hipp	- Mathematics
Betty C. Webber	- English
Vivian Bracey Metze	- Science

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Characteristics of Metals---99

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A Proposal of Camden High Schoo

Vocational Interdisciplinary Program

OVERALL PROGRAM OBJECTIVES:

1. To improve academic achievement.
2. To help students see the relevance of academic subjects to vocational co
3. To prepare students for post high school training (either college or tec employment.
4. To motivate students to enter skill training programs.
5. To help reduce the drop-out rate.
6. To help remove the stigma usually connected with vocational subjects.
7. To help students see the value of teamwork and to assist those with lead abilities.

A Proposal of Camden High School's
Vocational Interdisciplinary Program of Study

.

nce of academic subjects to vocational courses and to their later lives.

gh school training (either college or technical school) or for gainful

kill training programs.

e.

ly connected with vocational subjects.

of teamwork and to assist those with leadership potential to realize their

ORIENTATION

LABORATORY

ORIENTATION

OBJECTIVES: MACHINE TECHNOLOGY

1. To organize class that tools will be replaced, machine clean and floor sweep, in an orderly way.
2. That each student will wear safety clothing in shop such as short sleeves, long pants with shirt tails in and socks worn with shoes.
3. Introduce students to each machine in shop demonstrating how each works.

ORIENTATION

OBJECTIVES: S

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e in shop

S C I E N C E

ORIENTATION

OBJECTIVES: SCIENCE

1. To demonstrate the use of each simple machine and show how speed, direction, and force are changed.
2. To make graphs plotting vectors of convient scales applying the law of moment and parallel forces to all kinds of levers.
3. To calculate and demonstrate the work done by simple machines.
4. To calculate the mechanical advantages of simple machines used in industry and in the home.
5. To record and calculate the work done with incline planes by sliding a wooden block on the planes of the following dimensions: 1'x3", 1'x5', 1'x2", and 1'x1½'.
6. To record and calculate the efficiency of a pulley in lifting weight in pounds and in grams.
7. To write up scientific reports as outlined by

MATHEMATICS

ORIENTATION

OBJECTIVES: MACHINE TECHNOLOGY

1. Class organization.
2. General outline of course.
3. Simple machines and their formula.
    - 3.1 The lever.
    - 3.2 The inclined plane.
    - 3.3 The wheel and axle.
    - 3.4 The pulley.
    - 3.5 The wedge.
    - 3.6 The screw.

ORIENTATION

OBJECTIVES: MACHIN

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COMMUNICATIONS

ORIENTATION

OBJECTIVES: MACHINE TECHNOLOGY

1. 9 out of 10 students will be able to spell correctly all the words in the list given.
2. 8 out of 10 students will be able to read for the main idea in a paragraph or group of paragraphs.
3. 10 out of 10 students will be able to use different types of reference materials.
4. 7 out of 10 students will be able to give and follow oral and written directions.

LABORATORY	
	OUTLINE A. B. C. D.

RY

SCIENCE

scientific format.

OUTLINE OF CONTENT

- A. Class organization
  - 1. Procedures and used of basic tools in laboratory.
  - 2. Observation of safety precautions.
  - 3. Format of Laboratory report.
- B. Introduction and use of simple machine
  - 1. Lever
  - 2. Pulley
  - 3. Wheel and Axle
  - 4. Incline Plane
  - 5. Screw
  - 6. Wedge
- C. Applications of simple machine
  - 1. Lever
  - 2. Pulley
- D. Mechanical advantage
  - 1. Input and Output of machines

MATHEMATICS

COMMUNICATIONS

LABORATORY

PRE AND POST TEST

1. Name that the tool crib keeper is to do at end of period.
2. Who is responsible to clean off the machine that you work on during period.?
3. How many days do the sweepers sweep before some one else replaces them?
4. Who sweeps when one of the assigned sweepers is absent?

E.

F.

PRE AND POS

1.

2.

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ep before

ed sweepers

2. What is efficiency?

E. Frictional forces

1. Sliding
2. Rolling

F. Force

1. Gravitational
2. Vector Quantity
3. Constructing force diagrams
4. Parallel forces
5. Law of Moments

PRE AND POST TEST

1. What are five fundamental things that machines can do?
2. Write the fundamental use for each of the following machines.
    a. a bicycle
    b. an electric generator
    c. an automobile jack
    d. a pulley on a flag pole
    e. rake handle

M A T H E M A T I C S

PRE AND POST TEST

1. Sketch and give an example of each of the three classes of levers.

2. (a) What is the mechanical advantage of a combination of pulleys that lifts a 600 lb. box when an effort of 150 lb. is applied?

   (b) If the box rises 5 feet when the effort pulls in 30 feet of rope, what is the work input?

   (c) What is the work output?

   (d) What is the efficiency?

PRE AND POST TES

Part I - Te

be written

a. How do

(2) smooth,

(6) prick p

(9) ball pe

plane, (13)

(17) screw,

(21) fricti

lls

PRE AND POST TEST

Part I - Test given orally by teacher, answers to be written on sheet of paper provided:

a. How do you spell these words: (1) characteristic, (2) smooth, (3) file card, (4) chisel, (5) scriber, (6) prick punch, (7) combination square, (8) trammels, (9) ball pen, (10) fillister, (11) lever, (12) inclined plane, (13) axle, (14) wheel, (15) pulley, (16) wedge, (17) screw, (18) efficiency, (19) energy, (20) potential,

7 (21) friction, (22) technology (23) lathe, (24) material,

LABORATORY

5. Name ten of the twenty-five machines you were introduced to in the shop.

6. Which of the article listed are not safe to be worn in shop.
    1. Chain bracelet
    2. Leather watch band
    3. Long sleeves
    4. Long pants

True or False

1. Stop a moving part of machine with hands.
2. Turn the power on a machine that another person is operating.
3. Help another person lift a heavy object that he could lift himself.
4. A person should not talk to another while operating a machine.
5. Machine should be stopped when making adjustments.

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SCIENCE

3. There are only two groups of basic machines, the ________ and the ____________.

4. What is friction?

5. What is the difference between actual mechanical advantage of a machine and its theoretical mechanical advantage?

6. How do we distinguish among the three classes of levers?

7. How much work does a student do on 5 lbs of books when he carries them up 24 ft. to the third floow?

8. An incline plane is 16 ft. long and 4 ft. high. Neglecting friction, what effort is required to roll a 360 lb. barrel up the plane?

9. A submarien is traveling 300 ft. below the surface of the ocean. How much pressure is exerted on a square inch of the submarine if the density of sea water is about 64 lbs/cu. ft.?

10. How does the close arrangement of molecules in a liquid help us do work?

MATHEMATICS

3. An inclined plane is 16' long and 3 ft. high.

   (a) How much force is required to push a 320 lb body up the incline?

   (b) How much work will be done?

4. How long must the handle of a windlass be if an effort of 12 lb. is to raise a 60 lb. pail of water fastened to the drum? The radius of the drum is 3 in.

5. A force of 10 lb. is applied to a pair of pliers to cut a wire at a distance of ½ in. from the pin. If the distance from the hand to the pin is 10 in., what is the resistance of the wire?

6. What is the mechanical advantage of a 6 in. nutcracker in which the nut is placed at an average distance of 3/4 in. from the pin?

7. What weight can be raised by a jackscrew having a pitch of 1/5 in. and a 2 ft. lever, when a force of 12 lb. is applied?

8. Draw a wheel and axle that will have a mechanical advantage of 8. Show the dimensions.

(25) milling mac
transform, (29)
(32) compound
b. How are you
read these direc
carefully and fo
(1) Don't do an
this entire list
on your paper.
(4) Draw a rect
out of your desk
back down. (6)
hand. PAUSE (8)
directions, all
on your paper an
Part II - Writte
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(25) milling machine, (26) shaper, (27) machinery, (28) transform, (29) transfer, (30) simple, (31) complex, (32) compound

b. How are you at following directions? I will read these directions to you. You are to listen carefully and follow the directions.

(1) Don't do anything until I have finished reading this entire list of directions. (2) Write your name on your paper. (3) Draw a circle around your name. (4) Draw a rectangle around this circle. (5) Get out of your desk, turn around three times, and sit back down. (6) Bark like a dog. (7) Raise your right hand. PAUSE (8) Now that I've finished reading these directions, all I want you to do is put your name on your paper and pass it in.

Part II - Written

a. In what reference book, would you look for information on each of the following topics:

(1) some important event of three or four months ago?

LABORATORY

Y	SCIENCE

10

MATHEMATICS

9. If an inclined plane is 3 ft. high, how long must it be to have a mechanical advantage of 8?

10. The efficiency of an automobile elevator is 60%. If a 4,000 lb. automobile is to be raised 5 ft., how much work must be put into the machine?

b.

c.

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h, how long

dvantage of 8?

levator is 60%.

e raised 5 ft.,

e machine?

(2) something that happened 300 or 400 years ago?

(3) the origin of a certain work?

b. Write directions for getting to your home from this school.

c. Read the following selection, and then choose the best completion.

The Talented Cricket

The field cricket is less than an inch long, and it is not very pretty. But, for a bug, it is loaded with talent.

A cricket can tell you the temperature. Count the number of chirps you hear from a cricket in 15 seconds. Then add 37.

The male cricket is a musician - a violinist. He plays his song by rubbing the inner edges of his front wings together. Sometimes you can hear him a mile away.

The female has no "voice". But both male and female crickets have ears - in their front legs. They're lucky. Most insects have no ears at all.

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Crickets are also good broad jumpers. A cricket can jump a hundred times its length.

Cricket fights are popular among the Chinese. In China, a good fighting cricket may cost as much as a horse. Often there is heavy betting on these fights. It is said that a famous cricket named Genghis Khan earned $90,000 in his lifetime.

1. The author's purpose is____________________.
   a. to explain why he owns a cricket.
   b. to ask for cricket fights in the U. S.
   c. to tell interesting things about the cricket.
   d. to praise Genghis Khan.
2. From the information in this article, you could not say that________________________.
   a. the cricket is an insect.
   b. crickets are good broad jumpers.
   c. female crickets make noise.
   d. crickets are found in China.
3. A word opposite in meaning to inner is __________.
   a. back

LABORATORY

608

RY	SCIENCE

609

MATHEMATICS

ICS

COMMUNICATIONS

b. side

c. outer

d. end

________from Dimensions

Scholastic Book Services

C. Materials

1. Enclyclopedias
2. Dictionaries
3. Readers' guides
4. Dimensions - Scope Reading Skills Books
5. Questionnaires, Medical
6. Social Security forms
7. Application blanks (employment)

LABORATORY

TEACHING

1.

2.

3.

4.

STUDENT

1.

2.

3.

POST TE

TEACHING PROCEDURES

1. Discussion on specific types of simple machines.
2. Demonstration (Some of the methods of producing friction).
3. Small group discussion and demonstration on pulley systems, levers, inclined planes.
4. Problem solving of mechanical advantages of simple machines.

STUDENT ACTIVITIES

1. Student will make inclined planes and calculate the work done by these planes.
2. Student will make graphs applying the law of moment for the three classes of levers.
3. Student will set up a pulley system and calculate the mechanical advantage.

POST-TEST

MEASUREMENT

L A B O R A T O R Y

OBJECTIVES: MEASUREMENT

1. The student will be able to identify the five or six major parts of the outside micrometer.
2. The student will be able to identify any fractional mark on the steel rule without counting the marks.
3. The student will be able to read the measurement of any dimension within the range of the one inch micrometer.
4. The student will be able to read and set down correctly on paper any measurement using a six inch verneer caliper.

OBJECTIV

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S C I E N C E

OBJECTIVES: MEASUREMENT

1. To find the cubic volume of a small box.
2. To find the distance from earth to the sun in units of feet, meters, and miles by exponential notations.
3. To calculate the percentage of error from experimental data as compared to standard constants.
4. To use units of measurements in different systems. (Foot-pound, Centimeter-gram-second, Engineering, Absolute, etc.)
5. To change centimeters and meters to inches and feet; pounds to kilograms; liters to quarts.
6. To find volume changes of a gas at different temperatures.
7. To apply the major concept of Boyles law with the use of a mamometer.
8. To find the specific gravity of a desk reagent by using the hydrometer.

MATHEMATICS

OBJECTIVES: MEASUREMENT

A. Ruler measurements.

1. Common ruler fractions.
    1.1 Addition.
    1.2 Subtraction.
    1.3 Multiplication.
    1.4 Division.
2. Measurements with the steel scale.
    2.1 Cumulative error.
3. Decimal fractions.
    3.1 Addition.
    3.2 Subtraction.
    3.3 Multiplication.
    3.4 Division.
    3.5 Rounding off decimals.
4. Decimal equivalents.
    4.1 Changing a fraction to a decimal.
    4.2 Changing a decimal to a fraction.
    4.3 Measurements of decimal fractions with the steel scale.

TICS

steel scale.

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on to a decimal.

l to a fraction.

ecimal fractions with

COMMUNICATIONS

OBJECTIVES: MEASUREMENT

1. 10 out of 10 students will be able to give at least one reason for the importance of measurement.
2. 9 out of 10 students will be able to use at least two systems of measurement.
3. 9 out of 10 students will be able to use correctly some of the prefixes connected with measurement.
4. 9 out of 10 students will be able to spell correctly all the words in the list given.
5. 10 out of 10 students will write paragraphs about and will take part in a discussion about their place in the universe and their responsibilities as individuals.

LABORATORY

SCIENCE

9. To relate high and low viscosity rates with frictional resistance. (Demonstrate by use of metal surface with heavy oils, light oils.)

5. Percent.
    5.1 Percent error in measurements
6. The circle and its measurements.
    6.1 Radius.
    6.2 Diameter.
    6.3 Chord.
    6.4 Circumference.
    6.5 Area.

B. Angular measurement.
    1. The protractor.
    2. The degree, minute, and second.
    3. The mil.

C. Auxiliary measuring devises and their use.
    1. Vernier calipers.
    2. The micrometer.
    3. Outside calipers.
    4. Inside calipers
    5. Hermaphrodite calipers.
    6. Dividers.

se.

COMMUNICATIONS

LABORATORY

OUTLINE OF CONT

A. Linea

1. V

2. I

3. P

B. Metri

1.

2.

3. E

a

b

c

4.

a

b

5.

SCIENCE

OUTLINE OF CONTENT

A. Linear Measurements
   1. Volume
   2. Distance
   3. Percentage of error

B. Metric System (class requirement)
   1. History of measurements
   2. English system of measurement
   3. Properties and measurement of matter
      a. volume
      b. mass
      c. weight
   4. Systems of measurements
      a. Centimeter-gram-second (CGS)
      b. Meter-Kilogram-Second (MKS)
      c. Foot-pound-second (FPS) (English engineering)
      d. English Absolute
   5. Conversion in measurements
      a. English to metric
      b. Metric to English

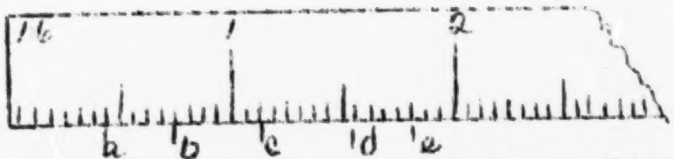
MATHEMATICS

S	COMMUNICATIONS

LABORATORY

PRE AND POST TEST

1. Write the correct fraction for the following problems:



2. Put period over each mark which would read in eights of an inch or ruler above.

3. Measure each of the following lines to the nearest 1/16 using your steel rule.

a.______ b.____ c.______ d.__________ e.________

6.

7.

C. D

D. S

E. V

PRE AND POS

1. D

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2. W

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3. W

m

4. H

m

6. Measurement of temperature
7. Useful Constants and Formulas
    a. pressure in liquids
    b. Pascal Law
    c. Charles Law
    d. Boyles Law
    e. Liquid transmit pressure

C. DENSITY

D. **SPECIFIC GRAVITY**

E. VISCOSITY

PRE AND POST TEST

1. Discuss the importance of measurement in science, in every day living.
2. What are the basic units of length, mass, volume, time, force, energy, and power in the metric system?
3. What is the difference between the weight and mass of an object?
4. How many liters are there in 400 Milliters? How many gallons are there in the same amount of liters?

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d read

to the

MATHEMATICS

PRE AND POST TEST

Add the following fractions.

1. $\frac{3}{16} + \frac{5}{8}$ 3. $\frac{13}{64} + \frac{3}{32} + \frac{1}{4}$

2. $\frac{15}{32} + \frac{1}{4}$ 4. $\frac{3}{8} + \frac{1}{2} + \frac{11}{32}$

Subtract the following.

5. $\frac{3}{4} - \frac{3}{8}$ 7 $\frac{5}{8} - \frac{5}{32}$

6. $\frac{63}{64} - \frac{15}{16}$ 8. $\frac{11}{16} - \frac{1}{4}$

Multiply the following.

9. $\frac{3}{4} \times \frac{7}{8}$ 10. $\frac{1}{2} \times \frac{15}{32}$

PRE AND P

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(2)

(6)

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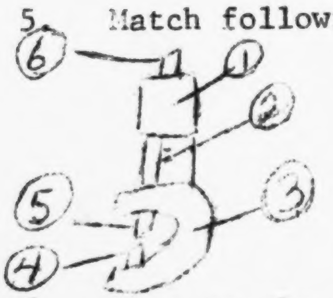
S	COMMUNICATIONS
	PRE AND POST TEST Part I - Test given orally by teacher, answers to be written on sheet of paper. How do you spell these words? (1) Micrometer, (2) scale, (3) fraction, (4) decimal, (5) millimeter, (6) centimeter, (7) decimeter, (8) meter, (9) kilometer, (10) grams, (11) liter, (12) radius, (13) diameter, (14) circumference, (15) Vernier, (16) caliper Part II Written

LABORATORY

4. Write down the reading of each mark within one inch on the ruler using the 1/16 scale.

5. Match following name of parts to micrometer



Ratchet
Thimble
Frame
Hub or Sleeve
Anvil
Spindle

6. Measure the six blocks with the micrometer and write down each measurement.

7. Set the verneer caliper on following reading:

a. 1.200 b. 2.312 c. 2.877

8. Measure test bar with verneer caliper and correctly state it on answer sheet.

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SCIENCE

5. A rectangular wooden crate is 60 ft. long, 2.5 ft. wide, and 36 in. high. Find the volume of the crate.

6. The volume of an unknown fluid is 30 milliters, its weight is 240 grams. What is the denisty of this unknown fluid?

7. A rectangular box 3.0 meters long, 2.3 meters wide and 150 centimeters in depth, determine its volume in cubic meters.

8. The volume of a confined gas is 10 liters at 25 deg. Centigrade. The temperature is decreased to 12 deg. Centigrade. What is the final volume of the confined gas? Whose law applies in this problem?

9. The sun is approximately 96,000,000 miles from earth. Express this distance in exponential notation.

10. State Pascal's law. Apply this law to the hydraulic jacks, or brakes.

MATHEMATICS

Divide the following.

11. $\frac{3}{4} \div 2$ 12. $\frac{7}{8} \div 8$

The following measurements are obtained from a scale with "readable graduations". Express them correctly by reducing them to the lowest terms.

13. $\frac{4}{32}$ in. 17. $\frac{20}{32}$ in.

14. $\frac{8}{32}$ in. 18. $\frac{24}{64}$ in.

15. $\frac{12}{32}$ in. 19. $\frac{48}{64}$ in.

16. $\frac{8}{64}$ in. 20. $\frac{32}{64}$ in.

Measure each of the following lines to the nearest 16th inch.

21. __________ 23. ______________

22. ___ 24. __________________________

25. What is a fraction?

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b. Nam

c. Nam

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d. Wha

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C. Materi

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COMMUNICATIONS

a. What do the prefixes micro-, deci-, milli-, and centi- mean?

b. Name at least two different systems of measurement.

c. Name at least two reasons that measurement is important.

d. What do you believe is your responsibility to your fellow man?

C. Materials

1. Booklets - The Amazing Story of Measurement, The Lufkin Rule Company

2. Films

L A B O R A T O R Y

SCIENCE

MATHEMATICS

(a) "The

for discus

responsib

(b) "The

3. Books

(a) Me, N

(b) The C

4. Collection

Who Am I?

5. Poems

"No Man is

S

COMMUNICATIONS

(a) "The Powers of Ten" - Used as spring-board for discussion of man and his importance and responsibility as an individual

(b) "The Hangman"

3. Books

   (a) Me, Natalie

   (b) The Ox-Bow-Incident

4. Collection of short stories

   Who Am I?

5. Poems

   "No Man is an Island"

LABORATORY	
	TEACHIN
	1.
	2.
	3.
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	5.
	STUDEN
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	3
	POST T

ORY

S C I E N C E

TEACHING PROCEDURES

1. Discuss volumetric and linear measurement.
2. Discussion of different systems of measurements.
3. Problem solving on conversions of measurements.
4. Experimentation and demonstration of Charles and Boyle's laws.
5. Lecture to summarize theories, principles and laws to apply major concept.

STUDENT ACTIVITIES

1. Student will find the linear measurements and volumes of blocks and solid objects.
2. Students will solve problems using units in English absolute, metric, Kilogram, metric centimeter systems.
3. Student will make a manometer and use it to demonstrate Boyle's law.

POST TEST

INTERPRETATION OF DRAWINGS AND SYMBOLS

LABORATORY

OBJECTIVES: INTERPRETATION OF DRAWINGS AND SYMBOLS

1. Students shall be able to sketch one, two and three view drawings of one part objects.
2. He shall be able to make a project within the stated tolerance from a drawing.

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SCIENCE

OBJECTIVES: INTERPRETATION OF DRAWINS AND SYMBOLS

1. To measure the dimensions of the science laboratory and make a convient conversion scale.
2. To record the distances in miles on a speedometer of a vehicle at the start and end of a trip from home to school.
3. To interpretate the units of measurements in EGS, MKS, AND CGS with respect to mass length, tome, force, energy, and power used in the machine in the laboratory, industry and every day living.
4. To interpret the meaning of ST, SP and STP with reference to temperature and pressure.
5. To interpret, calculate and demonstrate in written form positive and negative exponential expressions with powers of tens.
6. To interpret graphs and charts with special emphasis placed upon periodic charts of the elements.

MATHEMATICS

OBJECTIVES: INTERPRETATION OF DRAWINGS AND SYMBOLS

A. Ratio and proportion

B. Sketching

C. Dimensioning

   1. Finding missing dimensions

   2. Limit system of dimensioning (tolerance)

D. Symbols

E. Charts

OBJECTIV

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ND SYMBOLS

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ing (tolerance)

COMMUNICATIONS

OBJECTIVES: INTERPRETATION OF DRAWINGS AND SYMBOLS

1. 9 out of 10 students will be able to spell correctly all the words in the list given.
2. 10 out of 10 students will tell what a given blueprint communicates to them - how a blueprint is a communication device.
3. 9 out of 10 students will be able to give examples of commonly used symbols in our lives.
4. 7 out of 10 students will be able to spot symbolism in literature.
5. 9 out of 10 students will be able to show that the words we use are symbols.

L A B O R A T O R Y

OUTLINE

A.

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SCIENCE

OUTLINE OF CONTENT

A. Choosing scales

1. Floor plan of physical Science Laboratory
2. Interpretation of sizes and distances from scale drawings.
3. Converting actual lengths to scales.
4. Symbols readings and equivalents
5. Relating units to EGS, MKS, and CGS systems.
6. The periodic chart of elements
    a. Atomic number of element
    b. atomic weight
    c. symbol and name of element
    d. periods and family groups
7. Exponential notations
    a. multiplication
    b. division

MATHEMATICS

C O M M U N I C A T I O N S

LABORATORY

PRE AND POST TEST

1. The following notation on a drawing has a tolerance of how much?

   a. $1\frac{1}{2}'' \begin{matrix} + \frac{1}{64} \\ - \frac{1}{64} \end{matrix}$ b. $1.500 \begin{matrix} + 0.001 \\ - 0.002 \end{matrix}$

   c. 1.502
   1.498

2. Which of these indicate a hidden line?

   a. – – – – – – b. ——— - - ———

   c. ————————

3. Draw three view drawing of a rectangular 1" x 2" x ¼" in size with ½" hole through center of large side.

4. Draw an isometric drawing of the same object of number 3.

5. What do the following symbols stand for:

   a. ½ 20 NC b. 3/8 NC LH c. scale 1:2

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1.500 $^{+\ 0.001}_{-\ 0.002}$

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with ½" hole through

wing of the same

symbols stand for:

NC LH   c.   scale 1:2

SCIENCE

PRE AND POST TEST

1. Give the correct symbol and oxidation numbers of the following.

a. Zinc	f. Zinc Oxide
b. Ferrous	g. Ferric Oxide
c. Nickel	h. Aluminum Nitrate
d. Tin	i. Copper (II) Sulfate
e. Aluminum	j. Lead Dioxide

2. Balance the following equations.

$Fe + O_2 \rightarrow Fe_2O_3$

$Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$

Hot $Al + HOH \rightarrow Al(OH)_3 + H_2\uparrow$

$Al + HCl \rightarrow AlCl_3 + H_2\uparrow$

3. What is the meaning of STP for standard conditions?

4. What is the Fahrenheit temperature if the thermometer reads 200 deg. Centigrade?

5. What is the Celsius temperature if the thermometer reads 50° F?

MATHEMATICS

COMMUNICATIONS

LABORATORY	S
	6. How many groups there? 7. How are the gr most orbit rela 8. If a scale is of a room whose 2½" by 2½. 9. If the atomic atomic weight electrons and 10. Using the scal would you use TEACHING PROCEDURES 1. Discussion on 2. Lecture and de reading. 3. Group and indi symbols, eleme 4. Problem solvin

SCIENCE

6. How many groups or families of elements are there?
7. How are the groups of elements and the outer most orbit related?
8. If a scale is ¼" = 2', find the area of the floor of a room whose dimensions are represented as 2½" by 2¼.
9. If the atomic number of an element II and the atomic weight or mass is 23, how many protons, electrons and neutrons does this element have?
10. Using the scale 1 inch = 5 ft., how many inches would you use to represent a desk 28 inches high?

TEACHING PROCEDURES

1. Discussion on scale drawings.
2. Lecture and demonstration on charts and graph reading.
3. Group and individual participation in writing symbols, elements, compounds, and equations.
4. Problem solving of scale interpretations.

MATHEMATICS

COMMUNICATIONS

L A B O R A T O R Y

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2. Studen

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POST TEST

S C I E N C E

STUDENT ACITVITIES

1. Student will use symbols for writing elements, compounds, and equations.
2. Student will convert actual lengths to scale.
3. Student will use equivalent for expressing Standard conditions.

POST TEST

DRILLING

LABORATORY

OBJECTIVES: DRILLING

1. Student will be able to recognize by sight and set speed, set up work and perform the following operations on two of the four types of drill presses: drill holes, ream holes, countersink, and counterbore.

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OBJECTIVES: DRILLING

1. To use differe
to indicate th
resistant arm)
2. To demonstrat
by the use of
and a spring (
3. To demonstrat
a system of pi
4. To make screws
thickness arou
5. To calculate t
clined planes
6. To demonstrat
of speed accel
7. To use the uni
kinetic energy

sight
rm the
our
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bore.

SCIENCE

OBJECTIVES: DRILLING

1. To use different classes of leavers and to indicate the parts (fulcum, effort arm, resistant arm).
2. To demonstrate how energy can be transmitted by the use of a metric stick, small weights, and a spring (scale).
3. To demonstrate how the skeleton is used as a system of pivots and levers.
4. To make screws by wrapping paper of different thickness around nails.
5. To calculate the mechanical advantages of inclined planes and levers.
6. To demonstrate with toy cars the difference of speed acceleration and velocities.
7. To use the units of energy in calculating kinetic energy of moving bodies.

MATHEMATICS

OBJECTIVES: DRILLING

A. Geometry of the circle
B. The lever and its applications
C. The pulley and its applications
D. Taps and tap drill sizes
  1. Calculation
  2. Chart
E. Cutting speeds
  1. Change fpm to rpm
    1.1 Calculation
    1.2 Chart
F. Reaming
  1. Calculation of drill size
G. Spotfacing
  1. Calculation of diameter to spotface
H. Countersinking
  1. Calculation of depth to countersink

OBJECTIVES: DR

9 out of

correctly

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to spotface

countersink

COMMUNICATIONS

OBJECTIVES: DRILLING

9 out of 10 students will be able to spell correctly all the words in the list given.

664

LABORATORY

OUTLINE OF C

A. Ge

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B. Mo

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C. Fr

SCIENCE

OUTLINE OF CONTENT

A. General Principle of Machines
  1. Concepts of speed, velocity and acceleration.
  2. Force as related to mass and acceleration.
  3. Acceleration variable force and mass.
  4. Acceleration due to gravity.
B. Motion
  1. Energy
  2. Potential energy
  3. Kinetic Energy
  4. Kinetic Molecular Theory
  5. Units of energy
  6. Transformation of energy
C. Friction

  as it relates to simple machines
    a. Screws
    b. Levers

MATHEMATICS

COMMUNICATIONS

LABORATORY

PRE AND POST TEST

1. Name the two things that identifies the sensitive drill press.
2. Identify the following parts of the radial drill press from the drawing.

   a. arm b. column c. head

   d. table e. base
3. Drill ¼ hole in material supplied and countersink for ¼ flat head machine screw.
4. Drill second hole 3/8" and counterbore for socket head capscrew.
5. Drill third hole and ream 5/16".
6. Sharpen a twist drill and drill hole with it.

PRE AND POST TEST

1. Write the
   below in
   a. Force
   b. Numbe
      in sp
   c. Rate
   d. Force
   e. Push
   f. Deter
   g. Resis
      of mo
   h. Rate
   i. Two b
   j. Ratio
      per
   k. Abil
   l. Ener
2. Problems
   a. A 32
      sec.

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ll hole with

SCIENCE

PRE AND POST TEST

1. Write the terms for the phrases described below in the proper space.

   a. Force per unit area.
   a.________________
   b. Number of times a machine multiplies force in speed.
   b.________________
   c. Rate of doing work.
   c.________________
   d. Force times the distant the force acts.
   d.________________
   e. Push or pull.
   e.________________
   f. Determined by both speed and direction.
   f.________________
   g. Resistance of a body to change in its state of motion.
   g.________________
   h. Rate of change of Velocity.
   h.________________
   i. Two basic types of machines.
   i.________________
   j. Ratio of output of work to input of work in per cent.
   j.________________
   k. Ability to do work.
   k.________________
   l. Energy of work.
   l.________________

2. Problems

   a. A 3200 lb. car is traveling at a rate of 44 ft. sec. (30 MPH). The acceleration due to

MATHEMATICS

	COMMUNICATIONS

LABORATORY

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TEACHING PROC

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STUDENT ACTIV

1. Stu

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2. Stu

gravity is 32 ft/sec/sec. Calculate the Kinetic energy.

b. What is the Kinetic energy of an object of an object whose mass is 100 grams that is traveling at a velocity of 5 centimeters per second?

c. A car weighs 4000 lbs. It is raised on a lift to a height of 8 feet. What is the gravitational potential energy?

TEACHING PROCEDURES

1. Demonstrations
2. Discussions
3. Experimentation
4. Problem Solving
5. Lecture

STUDENT ACTIVITIES

1. Students will demonstrate with the different classes of levers and show the fulcrum, the effort and the resistant arms.
2. Student will experiment with meter stick, weights,

MATHEMATICS	C

COMMUNICATIONS

LABORATORY	
	and sprin transmitt 3. Student potential

POST TEST

ORY

SCIENCE

and spring scales; and show how energy is transmitted.

3. Student will solve problems for kinetic and potential energy.

POST TEST

THE LATHE

LABORATORY

OBJECTIVES: THE LATHE

1. He shall properly oil the lathe before beginning work each day according to instructions.
2. He shall recognize the different types of lathes by placing name under the picture of each.
3. He shall perform twelve operations by making projects which involve these operations.

OBJECTIVES: T

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S C I E N C E

OBJECTIVES: THE LATHE

1. To demonstrate the foot-pound as a unit of work by moving a 75 lb. object a distant of 10 ft. to determine the amount of work done.
2. To diagnose force table and illustrate the resultant of two forces acting at right angles to each other.
3. To demonstrate on table set-up of pivoted meter stick the necessary weights to show equilibrium conditions of moment of force (clockwise torque, conterwise torque).
4. To compare the force of rolling friction with force of sliding friction using wooden blocks and a small cart on an incline plane with smooth surface.
5. To demonstrate the property of inertia by shooting a marble against a baseball.
6. To demonstrate with toy cars that force is directly proportional to the mass and acceleration, Fe MA, and the mass is directly proportional to the

MATHEMATICS

OBJECTIVES: THE LATHE

A. Computing spindle speeds
  1. Ratio and proportion
    1.1 with pulleys
    1.2 with gears
B. Calculating feeds and speeds
  1. Charts
  2. Formulae
    2.1 Converting fpm to rpm
C. Center drilling
  1. Locating the center of a circle
    1.1 Mathematical methods
    1.2 Mechanical methods
  2. Testing centers
  3. Selecting the center drill
    3.1 Measuring the diameter
    3.2 Calculation
    3.3 Chart
D. Rough and finish turning
  1. Calculating and measuring rough turned

OBJECTIVES: THE LAT

1. 8 out of 1
paper on s
lathe or m
2. 7 out of 1
correctly

turned

COMMUNICATIONS

OBJECTIVES: THE LATHE

1. 8 out of 10 students will write a research paper on some subject connected with the lathe or machine technology.
2. 7 out of 10 students will be able to spell correctly all the words in the list given.

L A B O R A T O R Y

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7. To d

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acceleration and indirectly proportional to the force.

7. To demonstrate the application of Newtons Third Law with a rotary Sprinkler.

diameters

2. Use of the cross-feed to finish turn
    2.1 Limits
    2.2 Calculating graduations for adjusting cross feed

E. Facing
    1. Cutting speeds for facing
    2. Facing to length
        2.1 The hook rule

F. Undercutting and recessing
    1. Calculating depth of undercut
    2. Calculating cross-feed graduations

G. Shoulder turning
    1. Use of the radius gage

H. Knurling
    1. Calculating rpm of work

I. Filing and polishing
    1. Calculating spindle speeds

J. Drilling and reaming
    1. Converting diameter of reamed holes to

COMMUNICATIONS

turn

adjusting

ons

oles to

LABORATORY

SCIENCE

drill sizes.

    1.1 Chart

2. Cutting speed for reaming

K. Turning and boring tapers

1. Taper per inch
2. Offset method
    - 2.1 The pythagorean theorem
3. Taper attachment
    - 3.1 Right triangle trigonometry
    - 3.2 The protractor

L. Cutting screw threads

1. Terminology
    - 1.1 Internal and external threads
    - 1.2 Major diameter and its calculation
    - 1.3 Minor diameter and its calcualtion
    - 1.4 Pitch diameter and its calculation
    - 1.5 Lead...
    - 1.6 Lead angle...
    - 1.7 Crest...
    - 1.8 Root...

COMMUNICATIONS

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LABORATORY	

	SCIENCE

M A T H E M A T I C S	C O M
1.9 Depth...	
1.10 Limits o size..	
1.11 Tolerance	
1.12 Allowance...	
1.13 Basic size...	
1.14 Nominal size...	
1.15 Truncation...	
1.16 Depth of engagement	
2. Formulae for the unified thread	
2.1 Thread tables	
3. The quick change gear box	
4. Use of the screw thread tool gauge and the center gauge	
5. Computing the depth of infeed	
6. Multiple threads	
7. Methods and instruments for measuring threads.	
7.1 The thread pitch gauge	
7.2 The ring thread gauge	
7.3 Thread micrometer	
7.4 Thread plug gauge	

the

threads.

COMMUNICATIONS

LABORATORY	

	SCIENCE

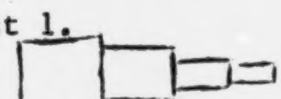
7.5 The three wire method

S	COMMUNICATIONS
	61

LABORATORY

PRE AND POST TEST

Test 1.

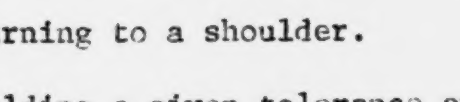


Straight turning in an independent chuck.

Turning to a shoulder.

Holding a given tolerance on all dimensions.

Test 2.



Straight turning between centers.

Turning to a shoulder.

OUTLINE OF CON

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B. Forc

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PRE AND POST T

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SCIENCE

OUTLINE OF CONTENT

A. The scientific meaning of work

B. Force

C. Motion and Velocity

D. Friction

  a. Sliding

  b. Rolling

E. Newtons Laws of Motion

  1. Newton's first law of motion

  2. Newton's second law of motion

  3. Newton's third law of motion

PRE AND POST TEST

1. What force in Newton's is required to accelerate a small cart with a mass of 10 kg at a rate of 5 N/sec/sec in an easterly direction.

2. State Newton's third law of motion. How many forces are involved? How many objects are involved?

3. What property of an object do we measure when we measure its mass?

MATHEMATICS	CO

COMMUNICATIONS

LABORATORY

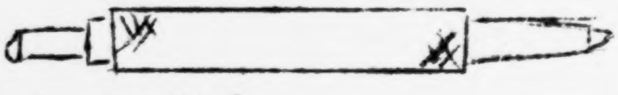
Undercutting

Chamfering

Filing

Holding a given tolerance on all dimension.

Test 3. Centerpunch



Facing in chuck

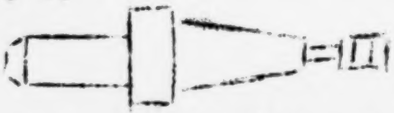
Straight turning

Turning taper with compound rest

Knurling

Filing and polishing

Test 4.



Straight turning between centers

Turning to a shoulder

Facing

Turning a taper with taper attachment

Chamfier

Undercutting

Threading

4. The rate of c
called ______

5. How many foot
the followin

a. An eleva
weighing
the grou

b. A tracto
of 2000

c. A crane
to the t

ion.

SCIENCE

4. The rate of change in velocity of an object is called ________________.

5. How many foot pounds of work are done in each of the following examples?

   a. An elevator weighing 1000 pounds lift a man weighing 200 lbs. to a height 30 ft. above the ground.

   b. A tractor pulls on a tree stump with a force of 2000 pounds, but the stump does not move.

   c. A crane lifts a steel beam weighing 400 lbs. to the top of a 300 feet high building.

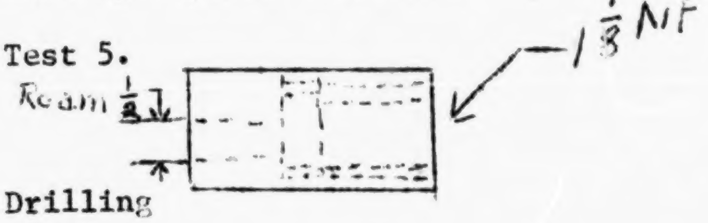
MATHEMATICS

S	C O M M U N I C A T I O N S

LABORATORY

Holding a given tolerance

Test 5.



Drilling

Reaming

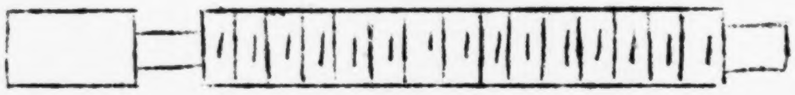
Boring

Recessing

Internal threading

Facting

Test 6.

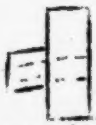


Undercutting

Facing

Cutting acme thread using follower rest

Test 7.



Straight truning on mandrel

Facing between centers

Drilling

Reaming

SCIENCE

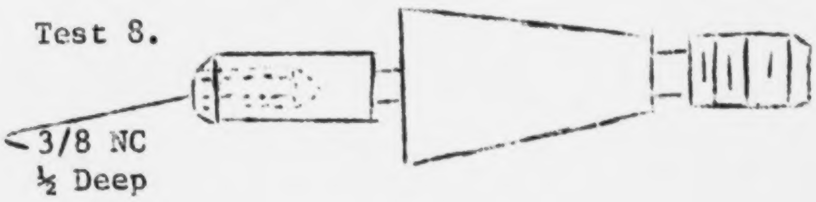
MATHEMATICS

S	COMMUNICATIONS

LABORATORY

Turning to shoulder

Test 8.



Facing

Straight turning between centers

Taper turning with taper attachment

Undercutting

Threading

Drilling

Tapping

Chamfering

Filing and polishing

Holding a given tolerance on all dimension

Y	SCIENCE
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MATHEMATICS

	COMMUNICATIONS

LABORATORY

TEACHING PROCEDURES

1. Demonstratio
2. Problem Solv
3. Lecture

STUDENT ACTIVITIES

1. Student will
   the pulley s
2. Student will

POST TEST

SCIENCE

TEACHING PROCEDURES

1. Demonstrations
2. Problem Solving
3. Lecture

STUDENT ACTIVITIES

1. Student will demonstrate the work done through the pulley system
2. Student will apply Newton's Laws of Motion.

POST TEST

MILLING MACHINE

LABORATORY

OBJECTIVES: MILLING MACHINE

1. The student shall be able to select the proper cutter and type milling machine to do side milling, plain milling, straddle milling, end milling, index milling, and helical milling by making projects which require this.
2. The student shall set up work on milling machine using six different methods to hold work.
3. The student shall set speeds and feeds on the milling machine by calculation and chart.

OBJECTIVES: MILLI

1. To perf
spring s
property
2. To demo
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3. To exper
objects,
adhesion
4. To discu
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5. To discu
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of a met
7. To calcu
vaporiza
8. To discu
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machine to
, straddle
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ects which

on milling machine
hold work.
nd feeds on the
and chart.

SCIENCE

OBJECTIVES: MILLING MACHINE

1. To perform an experiment on Hooke's law using spring scales and weight indicating the property of elasticity.
2. To demonstrate the property of cohesion by using talcum powder and powdered zinc sterate on water.
3. To experiment with soapless detergents, oiled objects, and to demonstrate the properties of adhesion and surface tension.
4. To discuss the difference between heat and temperature and show how they relate.
5. To discuss that boiling and freezing points are definite with pure substance.
6. To determine the coefficient of linear expansion of a metal with the linear expansion apparatus.
7. To calculate the specific heat of fusion and vaporization of a solid and a liquid.
8. To discuss the method by which heat energy may be transferred from one point to another.

MATHEMATICS

OBJECTIVES: MILLING MACHINE

- A. Speeds and feeds for milling
  - 1. Calculation
  - 2. Charts
- B. Side milling square and hex heads on bolts
  - 1. Calculating diameter of stock to mill flats
- C. Straddle milling
  - 1. Selecting cutters and spacers
  - 2. Calculating distance to move table
- D. Computing and gauging key seats
- E. Indexing
  - 1. Circular measurement in degrees, minutes, and seconds
  - 2. Indexing for gear cutting
- F. Helical milling
  - 1. The helix and the spiral
    - 1.1 The helix angle
    - 1.2 The helix lead
  - 2. The trigonometry of the right triangle

OBJECTIVES:

7 out of

correctly

CS

nds on bolts

ock to mill

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ve table

s

rees, minutes,

nt triangle

COMMUNICATIONS

OBJECTIVES: MILLING MACHINE

7 out of 10 students will be able to spell correctly all of the words in the list given.

LABORATORY

SCIENCE

MATHEMATICS

3. Gearing the milling machine to cut a helix
    3.1 Ratio and proportion

G. Gear cutting
    1. Gear-tooth notation and formulae
        1.1 The involute curve
        1.2 Depth of tooth
        1.3 Gauging gear teeth

ut a

COMMUNICATIONS

75

L A B O R A T O R Y

PRE AND POST TEST

Test 1. Square hammer head

Select milling machine

Side milling

Plain milling

Set speed

OUTLINE OF CO

1. Beh

a.

b.

c.

d.

2. Mol

a.

b.

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PRE AND POST

1. How

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2. Wha

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SCIENCE

OUTLINE OF CONTENT

1. Behavior of matter
   a. Elasticity
   b. Cohesion
   c. Adhesion
   d. Surface tension
2. Molecular Motion
   a. Temperature
   b. Coefficient of linear expansion
   c. Specific heat
   d. Heat of fusion
   e. Calories
   f. British Thermal Units (BTU)
   g. Methods of heat transfer

PRE AND POST TEST

1. How does the resiliency of steel compare with that of rubber?
2. What is elasticity? Is all matter elastic? Explain.
3. Cohesion and adhesion are forces between

MATHEMATICS

	COMMUNICATIONS

LABORATORY

set feed

Select work holding method

Test 2. T tap wrench

Select milling machine

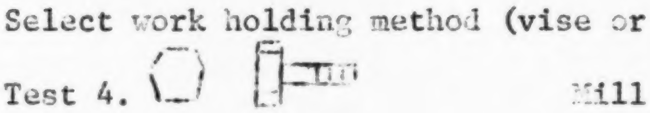
Select cutter

Set speed and feed

Select work holding method

Slott milling

Test 3. Keyway cutting

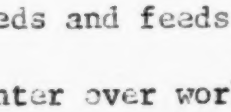


Select milling machine

Select cutters (end mill - plain milling cutter)

Set speed and feed

Select work holding method (vise or indexing attachment)

Test 4.  Mill hex on head of bolt

Select milling machine

Select cutters for straddle milling

Set up indexing attachment

Set speeds and feeds

Find center over work

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attachment)

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S C I E N C E

molecules. What is the difference between them?

4. What is a convient way of finding the specific gravity of a liquid?

5. How much does the volume of 48 liters of water increase when heated from 10 deg C to 60 deg C? The coefficient of volume expansion of water is 0.00019/deg C.

6. How much heat is required to raise the temperature of750 grams of iron from 10 deg C to 130 deg C?

7. How much heat energy is required to raise the temperature of 10 grams of ice at 0 deg C into steam at 100 deg C?

8. Explain the methods of heat transfer by conduction, convection and radiation.

9. As water is cooled from 50 deg F to 32 deg F what happens to its density?

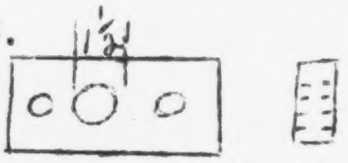
10. Why is it often necessary to leave a space between steel rails when building a railroad in cold weather?

MATHEMATICS

COMMUNICATIONS

LABORATORY

Test 5.



Holding work by bolt and tee slot

Drilling

Select milling machine

Select speed and feed

Drill

Bore

Hold dimenison within given tolerance.

TEACHING PROCEDURES

1. Experimentatio
2. Demonstration
3. Discussions
4. Problem solvin
5. Lecture and cl

STUDENT ACTIVITIES

1. Student will d
elasticity, co
tension of thr
demonstrations

TEACHING PROCEDURES

1. Experimentation
2. Demonstration
3. Discussions
4. Problem solving
5. Lecture and clarification of terms

STUDENT ACTIVITIES

1. Student will define and give examples of elasticity, cohesion, adhesion, and surface tension of through experimentation and demonstrations.

MATHEMATICS

S	COMMUNICATIONS

LABORATORY	
	2. Student volume iron. 3. Student and wat 4. Student conduct water POST TEST

2. Student will solve problem to determine the volume and linear expansion of water and iron.
3. Student will calculate the specific heat of a metal and water.
4. Student will demonstrate heat transfer by conduction, convection, and radiation of water and iron.

POST TEST

SAUS

LABORATORY

OBJECTIVES: SAWS

1. The student will be able to select the correct blade for sawing mild steel, tool steel, and aluminum.
2. The student will be able to set proper speed and feed for sawing mild steel, tool steel and aluminum.

OBJECTIV

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OBJECTIVES: SAMS

1. To discuss Newtons laws of universal gravitational attraction.

$$\frac{W_1}{W_2} = \frac{D_2^{-2}}{D_1}$$

2. To find by computation the speed of rotation of objects using the centripetal acceleration equation.

$$a = v^{2}/r$$

3. To discuss the relationship of velocity, time, distance and acceleration.

4. To construct a pendulum to be used as a timing device.

5. To demonstrate with a gyroscope the stability of its rotation.

OUTLINE OF CONTENT

A. Circular motion

B. Circular motion and Centrifugal forces

C. Circular Motion and friction

D. Uniform Velocity and Uniform Acceleration

MATHEMATICS

OBJECTIVES: SAWS

A. The power saw

1. Capacity of saw
2. Selection of blade
3. Method of requisition stock
4. Sawing speed
    1.1 Dry sawing
    1.2 Wet sawing

C O

OBJECTIVES: SAWS

S	COMMUNICATIONS
	OBJECTIVES: [illegible]

LABORATORY

PRE AND POST TEST

1. What blade would you use to saw mild steel? What speed and feed?
2. What is the correct blade for sawing aluminum? What speed? Feed?
3. What pitch blade is used to saw tool steed? Speed? Feed?
4. Name three types of saw blades used on vertical sawing machines.

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saw mild steel?

or sawing aluminum?

saw tool steed?

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SCIENCE

E. Periodic Motion - The Pendulum

PRE AND POST TEST

1. What forces act upon a ball which is falling toward the earth? What forces is acting upon the earth?
2. Explain why centrifugal and centripetal forces are examples of Newton's third law of motion.
3. An object starts from rest and falls freely under the force of gravity, (a) What is its average velocity at the end of 5 sec.? (b) What is its average velocity during the fall? (c) What distance has it fallen during this time?
4. How much extra speed do falling bodies pick up each second?
5. What three factors determine the magnitude of the centripetal force acting on a rotating body?
6. What is universal gravitation?

MATHEMATICS

ATICS	COMMUNICATIONS

LABORATORY

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TEACHING PRO

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7. Give several examples of how we use centrifugal force to our advantage.
8. What factors determine the period of vibration of a pendulum?
9. A ball having a mass of 0.05 kg is attached to the end of a cord 1.5 meter long. The ball is swung in a circular path at the end of the cord with a velocity of 8 m/sec. What is the force in newtons which tends to break the string?

TEACHING PROCEDURES

1. Discussion
2. Problem solving
3. Experimentation
4. Demonstration
5. Lecture for clarification of terms

MATHEMATICS

ATICS	COMMUNICATIONS

LABORATORY

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POST TE

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S C I E N C E

STUDENT ACTIVITIES

1. Students will solve problems to determine the centrifugal force of rotating bodies.
2. Students will make reports (oral and written) on the scientific accomplishments of Galileo and Newton.
3. Student will construct an accurate timing device (pendulum).

POST TEST

THE SHAPER

LABORATORY

OBJECTIVES: THE SHAPER

1. The student will set up work on the shaper and perform the operations needed to make serrations on a steel plate.

OBJECTIVE

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S C I E N C E

OBJECTIVES: THE SHAPER

1. To discuss the operation of hydraulic brakes on an automobile.
2. To illustrate on blackboard facts that the force per unit area (pressure) on the small piston is the same as that on the large piston.
3. To make a simple barometer and demonstrate the measurement of atmospheric pressure.
4. To discuss the difference between Charles' and Boyle's laws with reference to compressed gaseous pressure.
5. To demonstrate Bernoulli's principle by blowing across the upper surface of a sheet of paper. By blowing against the underside of a sheet of paper.
6. To discuss the automobile carburator as an application of Bernoulli's principle.
7. To demonstrate Bernoulli's principle by flowing water through a tube with different diameters.

MATHEMATICS

OBJECTIVES: THE SHAPER

A. Determing the length of the cutting stroke

B. Calculating the cutting speed

  1. Converting fpm to strokes per minute

    1.1 Mathematical calculation

    1.2 Tables

C. Indexing

  1. Review and continuation of milling machine indexing

D. Dovetails

  1. Measuring angles with the protractor

  2. More right triangle trigonometry

OBJECTIVES:

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stroke

minute

milling

ractor

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C O M M U N I C A T I O N S

OBJECTIVES: THE SHAPER

8 out of 10 students will be able to spell correctly all of the words in the list given.

LABORATORY

PRE ANDPOST TEST

1. Name the three types of shapers.
2. Make a plate ¼" x 1" x 3" and cut serrations on one side as per drawing.

OUTLINE OF

A.

B.

C.

D.

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PRE AND PO

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s.

cut serrations

SCIENCE

OUTLINE OF CONTENT

A. Hydraulic brakes

B. Pressure applied to liquids

C. Pascal's Law

D. Applications of Pascal's law

    1. Pressure on liquids

    2. Liquids transmit pressure

E. Boyle's Law

    1. Compressed gases exert pressure

    2. Pressure and gas volume

F. Bernoulli's Principle

G. Applications of Bernoulli's principle

PRE AND POST TEST

1. State the following and give an example of each:

    a. Pascal's law

    b. Boyle's law

    c. Charles' law

    e. Bernoulli's principle

MATHEMATICS

	COMMUNICATIONS

LABORATORY

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TEACHING

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2. In the hydraulic press, the small piston has an area of 0.5 in square and the larger one of 80 in square. What force must be applied to the small piston to balance a force of 2400 lbs. acting on the larger one?

3. When 300 in^3 of a gas under a pressure of 15 lb/ in^2 is compressed to a volume of 20 in^3, what will be its new pressure? The temperature is constant.

4. How can a small force on one piston of a hydraulic press produce such a large force on the other piston?

5. Does Boyle's law apply to liquids as well as gases?

6. Is the pressure at the bottom of a tank filled with gasoline as great as if the tank were filled with water? Why?

TEACHING PROCEDURES

1. Discussion
2. Illustrations

MATHEMATICS

C S	COMMUNICATIONS

LABORATORY

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STUDENT ACTIVIT

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POST TEST

SCIENCE

3. Demonstration
4. Problem solving
5. Lecturing for clarification of terms

STUDENT ACTIVITIES

1. Student will define Pascal's, Charles', Boyle's laws, and Bernoulli's principle.
2. Student will make barometers and explain their use.
3. Student will demonstrate and explain Bernoulli's principle as applied to an airplane lift.
4. Student will solve problems to determine the amount of pressure applied to liquids and gases.

POST TEST

CHARACTERISTICS OF METALS

L A B O R A T O R Y

OBJECTIVES: CHARACTERISTICS OF METALS

1. The student shall harden temper and test hardness of tool steel.
2. He shall be able to identify five different metals from six samples.

OBJECTIVES: C

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S C I E N C E

OBJECTIVES: CHARACTERISTICS OF METALS

1. To display samples of metals (hematite, magnetite, steel, aluminum, zinc, copper, tin, etc) in form of sheets, wires, rods, and powder.
2. To indicate the different physical properties of metals.
3. To calculate the density of metals (copper, tin, iron, aluminum).
4. To indicate the low melting point of tin by heating in direct flame. To show the softness of lead by cutting it with a dull knife.
5. To demonstrate oxidation of some metals by exposing metallic tin and iron to oxygen and moisture.
6. To coat carbon with copper by experimentation of copper plating with an electric current.
7. To demonstrate the reactions of Zn, Sn, Al, and Cu, steel with strong acids and strong bases.
8. To demonstrate the flame test on Zn, Sn, Al, and Cu.

MATHEMATICS

OBJECTIVES: CHARACTERISTICS OF METALS

A. Ferrous alloys

1. Percent

2. Points of carbon converted to percent

3. Heat treatment

3.1 Time requirements for depth of penetration

B. Non-ferrous alloys

1. Percent of composition

OBJECTIVES. CH

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	OBJECTIVES. CHARACTERISTICS OF METALS
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or depth of	

LABORATORY

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OUTLINE OF CO

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F. Met

G. Anti

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9. To demonstrate the reduction of friction with roller bearings, ball bearings, and lubricants.

OUTLINE OF CONTENT

A. Basic properties of metals
    1. Tensile strength
    2. Ductility
    3. Hardness
    4. Malleability
    5. Elasticity
B. General properties of alloys
C. Alloy steel
D. Stainless steel
E. Tempering Affects of metals
F. Metal plating
G. Anti-friction metals
    1. Polished bearings
    2. Ball bearings and roller bearings
    3. Lubricants

MATHEMATICS

CS	COMMUNICATIONS

LABORATORY

PRE AND POST TEST

1. To what temperature must steel be brought in order to get full hardness?
2. What is the second step in hardening steel?
3. What four methods are used to test the hardness of hardened steel?
4. Name four quenches used to cool steel during heat treating and give one advantage over one of the others.
5. What determines the temperature at which carbon steel is brought too before quenching?
6. Which has the greater amount of carbon - cast iron or steel?
7. What happens to cast iron if heated and quenched?
8. List the steps taken in which the harden and temper a piece of 1085 carbon steel. Carry this out and test for hardness before and after tempering on the "Rockwell" hardness testers. You will be graded on correct of steps and the results of the metal.

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SCIENCE

PRE AND POST TEST

1. What property of a metal enables it to be hammered or rolled into sheets?
2. What is the heat treatment of steel?
3. Name and explain two processes in which metals can be obtained from their ores.
4. The ability of a metal to withstand a stretching force is called its ______________.
5. An alloy of copper and zinc is
   - a. bronze
   - b. steel
   - c. brass
   - d. an oxide
   - e. hematite
6. Why are alloys often used instead of pure metals?
7. What metals are used to make solder?
8. Name at least five tools made from high-carbon steel.
9. What element is added to low-carbon steel to make it stainless?

MATHEMATICS

COMMUNICATIONS

LABORATORY

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TEACHING PROC

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POST TEST

10. Draw a copper plating electric cell. Name the solution used. Correctly name the electrodes. Indicate the flow of electrons. Give half and net reactions that take place in this cell.

TEACHING PROCEDURES

1. Demonstrations
2. Experimentation
3. Individual projects
4. Discussions
5. Lecture for clarification of terms.

STUDENT ACTIVITIES

1. Student will define physical properties of different types of steel, Fe, Zn, Cu, and Sn.
2. Through experimentation student will indicate the results of strong acids and bases on Zn, Pb, Sn, Al, and Cu.
3. Student will experiment with electroplating of metals and the oxidation of metals.

POST TEST

UNIT 1

MACHINE TECHNOLOGY

L A B O R A T O R Y

UNIT 1 MACHINE TECHNOLOGY

ORIENTATION

- A. Class organization
  1. Make clean up assignments.
  2. Safety dress and rules.
  3. Procedures for checking out tools and using machines.
- B. Introduction to shop and the machines in the shop.
  1. Drill presses
  2. Lathes
  3. Milling machines
  4. Power saws
  5. Shaper
  6. Gear Shaper
  7. Rockwell Hardness Tester
  8. Grinders
  9. Welding machines

UNIT 1 MA

ORIENTATI

A.

B.

	SCIENCE
	UNIT 1 MACHINE TECHNOLOGY
s and using es in the	ORIENTATION A. Class organization 1. Procedures and uses of basic tools in laboratory. 2. Observation of safety precautions. 3. Format for laboratory report. B. Introduction to simple machinery 1. Lever 2. Pulley 3. Wheel and Axle 4. Incline Plane 5. Screw 6. Wedge

MATHEMATICS

UNIT 1 MACHINE TECHNOLOGY

ORIENTATION

1. Class organization.
2. General outline of course.
3. Simple machines and their formula.
    - 3.1 The lever
    - 3.2 The inclined plane
    - 3.3 The wheel and axle
    - 3.4 The pulley
    - 3.5 The wedge
    - 3.6 The screw

UNIT 1 MACH

ORIENTATION

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COMMUNICATIONS

UNIT 1 MACHINE TECHNOLOGY

ORIENTATION

A. Spelling words connected with machinery and tools.

1. Lever
2. Inclined plane
3. Axle
4. Wheel
5. Pulley
6. Wedge
7. Screw
8. Transform and transfer (energy)
9. Efficiency
10. Energy
11. Potential
12. Friction
13. Machinery
14. Lathe
15. Technology
16. Simple, conpound, and complex machines

LABORATORY

Y	SCIENCE

MATHEMATICS	
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	D. Gi

COMMUNICATIONS

17. Material
18. Milling machine
19. Shaper
20. Smooth
21. Characteristic
22. Chisel
23. Scriber
24. Prick punch
25. Combination square
26. Trammels
27. Ball peen (hammer)
28. Fillister

B. Reading for the main idea

C. Use of reference materials

1. Dictionary
2. Encyclopedia
3. Readers' Guide

D. Giving and following oral and written directions.

794

UNIT 2

MEASUREMENT

LABORATORY

UNIT 2 MEASUREMENT

ORIENTATION

A. Reading six inch steel rule.

B. Reading micrometer.

C. Reading verneer scale.

UNIT 2 MEASUREM

ORIENTATION

A. Linear
   1. Vo
   2. Di
   3. Pe

B. Metric
   1. Hi
   2. En
   3. Pr
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   4. Sy
   5. Co
   6. Me

C. Densit

D. Specif

E. Viscos

SCIENCE

UNIT 2 MEASUREMENT

ORIENTATION

- A. Linear Measurements
    - 1. Volume
    - 2. Distance
    - 3. Percentage of error
- B. Metric System (class requirement)
    - 1. History of measurement
    - 2. English system of measurement
    - 3. Properties and measurement of matter
        - a. Volume, mass, and weight
    - 4. Systems of measurements
    - 5. Conversion in measurements
    - 6. Measurement of temperature
- C. Density
- D. Specific gravity
- E. Viscosity

MATHEMATICS

UNIT 2 MEASUREMENT

ORIENTATION

A. Ruler measurements

- 1. Common ruler fractions
    - 1.1 Addition
    - 1.2 Subtraction
    - 1.3 Multiplication
    - 1.4 Division
- 2. Measurements with the steel scale
    - 2.1 Cumulative error
- 3. Decimal fractions
    - 3.1 Addition
    - 3.2 Subtraction
    - 3.3 Multiplication
    - 3.4 Division
    - 3.5 Rounding off decimals
- 4. Decimal equivalents
    - 4.1 Changing a fraction to a decimal
    - 4.2 Changing a decimal to a fraction
    - 4.3 Measurements of decimal fractions with

CS	COMMUNICATIONS
	UNIT 2 MEASUREMENT
	ORIENTATION
	A. Spelling words
	1. Micrometer
	2. Scale
	3. Fraction
	4. Decimal
	5. Meter
teel scale	6. Decimeter
	7. Centimeter
	8. Millimeter
	9. Kilometer
	10. Gram
	11. Liter
	12. Radius
als	13. Diameter
	14. Circumference
n to a decimal	15. Vernier
to a fraction	16. Calipher
cimal fractions with	

LABORATORY

SCIENCE

MATHEMATICS

the steel scale

5. Percent

5.1 Percent error in measurement

6. The circle and its measurements

6.1 Radius

6.2 Diameter

6.3 Chord

6.4 Circumference

6.5 Area

B. Angular measurement

1. The protractor

2. The degree, minute, and second

3. The mil

C. Auxiliary measuring devises and their use

1. Vernier calipers

2. The micrometer

3. Outside calipers

4. Inside calipers

5. Hermaphrodite calipers

6. Dividers

B. Voca

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C. The

D. Indi
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S	COMMUNICATIONS
	B. Vocabulary
	1. Prefixes connected with measurement
rement	2. Suffixes connected with measurement
nts	C. The story of measurement
	D. Individual responsibility - our place in the universe
ond	
their use	

UNIT 3

INTERPRETATION OF DRAWING AND SYMBOLS

L A B O R A T O R Y

UNIT 3 INTERPRETATION OF DRAWING AND SYMBOLS

ORIENTATION

A. Shop drawing
    1. Lines used
    2. Three view drawings
    3. Two view drawings
    4. One view drawing
    5. Auxiliary view
    6. Isometric drawings
    7. Tolerances - upper and lower limit
    8. Shop sketches
    9. Symbols used on drawings

UNIT 3 INTERP

ORIENTATION

A. Choo
    1.
    2.
    3.
    4.

SCIENCE

UNIT 3 INTERPRETATION OF DRAWINGS AND SYMBOLS

ORIENTATION

A. Choosing Scales

1. Floor plan of the Physical Science Laboratory
2. Interpretation of sizes and distances from scale drawings.
3. Converting actual lengths to scales.
4. Symbols readings and equivalents.

M A T H E M A T I C S

UNIT 3 INTERPRETATION OF DRAWINGS AND SYMBOLS

ORIENTATION

A. Ratio and proportion

B. Sketching

C. Dimensioning

    1. Finding missing dimensions

    2. Limit system of dimensioning (tolerance)

D. Symbols

E. Charts

UNIT 3 INTERPRETA

ORIENTATION

A. Spellin

    1. Au

    2. Isc

    3. Dir

    4. To

    5. Sk

B. The bl

C. Words

D. Symbol

    1. Po

    2. Ot

E. Symbol

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COMMUNICATIONS

UNIT 3 INTERPRETATION OF DRAWINGS AND SYMBOLS

ORIENTATION

A. Spelling words
  1. Auxiliary
  2. Isometric
  3. Dimension
  4. Tolerance
  5. Sketch

B. The blueprint as a communication device

C. Words as symbols

D. Symbolism in our lives
  1. Political cartoons
  2. Other commonly used symbols

E. Symbolism in literature

UNIT 4

DRILLING

809

LABORATORY

UNIT 4 DRILLING

ORIENTATION

- A. Drill presses
  - 1. Sensitive drill press
  - 2. Upright drill press
  - 3. Radial drill press
  - 4. Gang drill press
  - 5. Multiplicable spindle drill press
- B. Drilling machines
- C. Drill bits
  - 1. Twist drills
  - 2. Core drill
  - 3. Flat drills
  - 4. Star drills
- D. Electric drill - (hand or portable)
  - 1. Safety in use of.
- E. Grinding drills

UNIT 4 D

ORIENTAT

A.

B.

C.

Y	SCIENCE
	UNIT 4 DRILLING
ill press rtable)	ORIENTATION A. Application of some simple machines 1. Lever 2. Pulley B. Mechanical Advantage 1. Input and output of machines 2. What is efficiency? C. General principles of machines 1. Force 2. Motion 3. Friction

MATHEMATICS

UNIT 4 THE DRILL PRESS

ORIENTATION

- A. Geometry of the circle
- B. The lever and its applications
- C. The pulley and its applications
- D. Taps and tap drill sizes
  - 1. Calculation
  - 2. Chart
- E. Cutting speeds
  - 1. Change fpm to rpm
    - 1.1 Calculation
    - 1.2 Chart
- F. Reaming
  - 1. Caluculation of drill size
- G. Spotfacing
  - 1. Calculation of diameter to spotface
- H. Countersinking
  - 1. Calculation of depth to countersink

UNIT 4 THE DRIL

ORIENTATION

- A. Spell
  - 1. S
  - 2. R
  - 3. W
  - 4. F
  - 5. T
  - 6. D
  - 7. C
  - 8. C

COMMUNICATIONS

UNIT 4 THE DRILL PRESS

ORIENTATION

A. Spelling words

1. Sensitive
2. Radial
3. Web
4. Flute
5. Tang
6. Drift
7. Counterbore
8. Countersink

UNIT 5

LATHES

L A B O R A T O R Y

UNIT 5 LATHES

ORIENTATION

- A. Types of lathes
  - 1. Bench or speed
  - 2. Engine lathe
  - 3. Gearhead lathe
  - 4. Gap lathe
  - 5. Turret lathe
- B. Nomenclature of bend lathe
- C. Care and maintenance
  - 1. Oil daily
  - 2. Keep clean
  - 3. Attachments should screw or spindle by hand
  - 4. Keep belt free of oil
- D. Lathe operations
  - 1. Straight turning
  - 2. Facing
  - 3. Turning tapers
    - a. Tailstock set over method

UNIT 5 LATHES

ORIENTATION

- A. The
  - 1.
- B. Forc
  - 1.
- C. Moti
- D. Fric
  - 1.
- E. Newt
  - 1.
  - 2.
  - 3.

SCIENCE

UNIT 5 LATHES

ORIENTATION

- A. The scientific meaning of work
  - 1. Measurement of work
- B. Force
  - 1. Measurement of force
- C. Motion and velocity
- D. Friction
  - 1. The coefficient of friction
- E. Newton's Laws of Motion
  - 1. Newton's first law of motion
    - a. Inertia
  - 2. Newton's second law of motion
    - a. units of force and mass
  - 3. Newton's third law of motion
    - a. application of Newton's third law of motion

MATHEMATICS

UNIT 5 THE LATHE

ORIENTATION

- A. Computing spindle speeds
  - 1. Ratio and proportion
    - 1.1 with pulleys
    - 1.2 with gears
- B. Calculating feeds and speeds
  - 1. Charts
  - 2. Formulae
    - 2.1 Converting fpm to rpm
- C. Center drilling
  - 1. Locating the center of a circle
    - 1.1 Mathematical methods
    - 1.2 Mechanical methods
  - 2. Testing centers
  - 3. Selecting the center drill
    - 3.1 Measuring the diameter
    - 3.2 Calculation
    - 3.3 Chart

UNIT 5 THE LA

ORIENTATION

A. Spe

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COMMUNICATIONS

UNIT 5 THE LATHE

ORIENTATION

A. Spelling words

1. Carriage
2. Spindle
3. Knob
4. Saddle
5. Knurl
6. Thread
7. Straight
8. Chuck
9. Collet
10. Mandrel
11. Mechanism
12. Alignment
13. Longitudinal
14. Tumbler
15. Acme thread
16. Hermaphrodite caliper

LABORATORY

- b. Taper attachment
- c. Compound rest method

4. Boring
5. Drilling
6. Reaming
7. Recessing
8. Undercutting
9. Taping
10. Knurling
11. Threading
    - a. external
    - b. internal
12. Radius turning

E. Hold work in the lathe

1. Chuckes
    - a. Independent chuck (ways of turing work)
    - b. Universal chuck
    - c. Drill chuck
2. Collets
3. Face plate

	SCIENCE
of turing work)	

MATHEMATICS

D. Rough and finish turning
  1. Calculating and measuring rough turned diameters
  2. Use of the cross-feed to finish turn
    2.1 Limits
    2.2 Calculating graduations for adjusting cross feed

E. Facing
  1. Cutting speeds for facing
  2. Facing to length
    2.1 The hook rule

F. Undercutting and recessing
  1. Calculating depth of undercut
  2. Calculating cross-feed graduations

G. Shoulder turning
  1. Use of the radius gage

H. Knurling
  1. Calculating rpm of work

I. Filing and polishing
  1. Calculating spindle speeds

17. C
18. T
19. R
20. S
21. R
22. D
23. A
24. A
25. M
26. S
27. F
28. S
29. P
30. U
31. S
32. C
33. P
34. L
35. T

	COMMUNICATIONS
	17. Cylindrical
ırned	18. Transverse
	19. Rotation
ırn	20. Safety
	21. Rough
adjusting	22. Decimal - equivalent table
	23. Anvil
	24. Angle
	25. Machinist
	26. Shoulder
	27. Fillet
	28. Swivel
	29. Protractor
s	30. Universal
	31. Standard
	32. Coarse
	33. Pitch
	34. Lubricant
	35. Transversity

L A B O R A T O R Y

4. Carriage

5. Centers and dog

6. Mandrel

F. Speeds and feeds

1. rpm

2. ft. per. minute

G. Lathe alignment

1. Matching center

2. Matching line on end of tailstock

3. Trial cut method

4. Dial indicator with test bar

H. Grinding tool bits

1. Threading tool

2. Straight turning tool-(left and right)

3. Round nose tool

4. Facing tool-(left and right)

5. Chip braker

I. Using the follower rest

J. Using the steady rest

	SCIENCE
k	
right)	

MATHEMATICS

J. Drilling and reaming

1. Converting diameter of reamed holes to drill sizes.

   1.1 Chart

2. Cutting speed for reaming

K. Turning and boring tapers

1. Taper per inch

2. Offset method

   2.1 The pythagorean theorem

3. Taper attachment

   3.1 Right triangle trigonometry

   3.2 The protractor

L. Cutting screw threads

1. Terminology

   1.1 Internal and external threads

   1.2 Major diameter and its calculation

   1.3 Minor diameter and its calculation

   1.4 Pitch diameter and its calculation

   1.5 Lead...

   1.6 Lead angle...

B. Res

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COMMUNICATIONS

B. Research paper on some subject connected with lathe or machine technology.

LABORATORY

	SCIENCE

MATHEMATICS

1.7 Crest...

1.8 Root...

1.9 Depth...

1.10 Limits o size..

1.11 Tolerance

1.12 Allowance...

1.13 Basic size...

1.14 Nominal size...

1.15 Truncation...

1.16 Depth of engagement

2. Formulae for the unified thread

   2.1 Thread tables

3. The quick change gear box
4. Use of the screw thread tool gauge and the center gauge
5. Computing the depth of infeed
6. Multiple threads
7. Methods and instruments for measuring threads

   7.1 The thread pitch gauge

   7.2 The ring thread gauge

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nd the

g threads

LABORATORY	

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7.3 Thread micrometer 7.4 Thread plug gauge 7.5 The three wire method	

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COMMUNICATIONS

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UNIT 6

MILLING MACHINE

LABORATORY

UNIT 6 MILLING MACHINE

ORIENTATION

- A. Types of milling machines
  - 1. Plain
  - 2. Universal
  - 3. Vertical
  - 4. Combinations of either two of the three above.
- B. Nomenclature of milling machine.
- C. Care and maintenance
  - 1. Oil daily
  - 2. Keep clean
- D. Methods for holding work
  - 1. Vise
  - 2. Fixtures
  - 3. Clamps
  - 4. Indexing attachment
  - 5. Rotary table
  - 6. Bolts and Tee slot on table

UNIT 6 MILLING MA

ORIENTATION

- A. Machine
- B. Energy
  - 1. Law
- C. Kinetic
  - 1. Ener
    - a.
- D. Heat ene
  - 1. Coeff
  - 2. Spec
  - 3. Heat

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S C I E N C E

UNIT 6 MILLING MACHINE

ORIENTATION

A. Machine in relation with energy

B. Energy

   1. Law of conservation of energy

C. Kinetic and potential energies

   1. Energy used to overcome friction

      a. Mechanical energy

D. Heat energy

   1. Coefficient of linear expansion

   2. Specific heat

   3. Heat of fusion

MATHEMATICS

UNIT 6 THE MILLING MACHINE

ORIENTATION

A. Speeds and feeds for milling
    1. Calculation
    2. Charts
B. Side milling square and hex heads on bolts
    1. Calculating diameter of stock to mill flats
C. Straddle milling
    1. Selecting cutters and spacers
    2. Calculating distance to move table
D. Computing and gauging key seats
E. Indexing
    1. Circular measurement in degrees, minutes, and seconds
    2. Indexing for gear cutting
F. Helical milling
    1. The helix and the spiral
        1.1 The helix angle
        1.2 The helix lead

UNIT 6 TH

ORIENTATI

Spel

I C S	COMMUNICATIONS
	UNIT 6 THE MILLING MACHINE
	ORIENTATION
g	Spelling words
	1. Column
	2. Knee
heads on bolts	3. Vertical
stock to mill	4. Horizontal
	5. Arbor
	6. Chatter
pacers	7. Coolant
move table	8. Helical
eats	9. Staggered tooth cutter
	10. Periphery
degrees, minutes,	11. Straddle
	12. Slitting
ng	13. Angular
	14. Convex
l	15. Concave
	16. Woodruff

LABORATORY

E. Methods for holding cutters

  1. Arbor

  2. Collets

  3. Bolt direct to spindle

F. Milling operations

  1. Plain milling

  2. Slide milling

  3. Straddle milling

  4. Boring

  5. Drilling

  6. Reaming

  7. Key way milling

  8. Form milling

  9. Gang milling

  10. Face milling

  11. Index milling

G. Milling cutters

  1. Plain milling cutters

    a. straight tooth

    b. helical tooth

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2. The trigonometry of the right triangle	17.
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helix	19.
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G. Gear cutting	21.
1. Gear-tooth notation and formulae	22.
1.1 The involute curve	23.
1.2 Depth of tooth	24.
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S	COMMUNICATIONS
ht triangle	17. Shaft
to cut a	18. Index
	19. Helix
	20. Herringbone
	21. Spur
mulae	22. Mesh
	23. Dedendum
	24. Diametral
	25. Chordal
	26. Involute

LABORATORY

  - 2. Side cutters
    - a. half side
    - b. plain side cutters
    - c. stagger tooth cutters
  - 3. Face mill cutters
  - 4. End mill cutters
  - 5. Angle cutters
  - 6. Form cutters

H. Milling attachment
  - 1. Indexing attachment
  - 2. Rotary indexing attachment
  - 3. Slotting attachment
  - 4. Vertical head (used on horizontal miller)

	SCIENCE
zontal miller)	

MATHEMATICS

	COMMUNICATIONS

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UNIT 7

SAWS

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LABORATORY

UNIT 7 SAWS

ORIENTATION

A. Types of power saw
    1. Metal cutting band saws
        a. upright or vertical
        b. horizontal
    2. reciprocating power saws

B. Nomenclature

C. Maintenance and lubrication

D. Types of blades and uses

E. Cutting speeds and feeds

F. Contour sawing

G. Coolants

H. Friction sawing

UNIT 7 SAWS

ORIENTATIO

A.

B.

C.

Y	SCIENCE
	UNIT 7 SAWS
	ORIENTATION A. Circular motion 1. Universal gravitation B. Circular motion and centrifugal forces 1. Uniform circular motion C. Circular motion and friction

MATHEMATICS

UNIT 7 SAWING

ORIENTATION

A. The power saw

1. Capacity of saw
2. Selection of blade
3. Method of requisition stock
4. Sawing speed
    1.1 Dry sawing
    1.2 Wet sawing

UNIT 7 S

ORIENTAT

COMMUNICATIONS

UNIT 7 SAWING

ORIENTATION

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UNIT 8

SHAPER

L A B O R A T O R Y

UNIT 8 SHAPER

ORIENTATION

- A. Types
  - 1. Crank
  - 2. Hydraulic
  - 3. Fellows gear shaper
- B. Nomenclature
- C. Maintenance and lubrication
- D. Controlling movements of rain and tool head
- E. Methods of setting up and securing work
  - 1. Center
  - 2. Vise
  - 3. Bolts and clamps
- F. Speeds and feeds
- G. Grinding cutting tools
- H. Exercises or operations
  - 1. Horizontal shaping
  - 2. Vertical shaping
  - 3. Angular shaping
  - 4. Internal and external key ways

UNIT 8 S

ORIENTAT

A.

B.

C.

and tool head

ring work

ways

S C I E N C E

UNIT 8 SHAPER

ORIENTATION

A. Hydraulic press

B. Pressure applied to liquids

   1. Pascal's Law

C. Application of Pascal's Law

MATHEMATICS

UNIT 8 THE SHAPER

ORIENTATION

A. Determining the length of the cutting stroke

B. Calculating the cutting speed

  1. Converting fpm to strokes per minute

    1.1 Mathematical calculation

    1.2 Tables

C. Indexing

  1. Review and continuation of milling machine indexing

D. Dovetails

  1. Measuring angles with the protractor

  2. More right triangle trigonometry

UNIT 8 THE SH

ORIENTATION

A. Spe

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COMMUNICATIONS

UNIT 8 THE SHAPER

ORIENTATION

A. Spelling words

1. Hydraulic
2. Crank
3. Reciprocating
4. Clapper box
5. Crossrail
6. Parallel
7. Vise
8. Accurate
9. Dovetail
10. Radial

UNIT 9

CHARACTERISTICS OF METALS

LABORATORY

UNIT 9 CHARACTERISTICS OF METALS

ORIENTATION

- A. Heat treating
    - 1. Furnaces
    - 2. Hardening
    - 3. Tempering
    - 4. Quenching
    - 5. Annealing
    - 6. Case hardening
    - 7. Normalizing
    - 8. Forging chisel
- B. Test hardness of metal
    - 1. File
    - 2. Rockwell hardness tester
    - 3. Brinell hardness tester
    - 4. Victor hardness tester
- C. Metal identification
- D. Machinability
- E. Ferrous metals

UNIT 9 CHARACTERIS

ORIENTATION

- A. Basic pro
    - 1. Tensil
    - 2. Ductil
    - 3. Hardne
    - 4. Malle
    - 5. Elasti
- B. General pr
- C. Alloy ste
    - a. stainl
- D. Tempering
- E. Metal pla
- F. Anti-frict
    - 1. Polish
    - 2. Ball b
    - 3. Lubric

SCIENCE

UNIT 9 CHARACTERISTICS OF METALS

ORIENTATION

A. Basic properties of metals
    1. Tensile strength
    2. Ductility
    3. Hardness
    4. Malleability
    5. Elasticity
B. General properties of alloys
C. Alloy steel
    a. stainless steel
D. Tempering affects of metals
E. Metal plating
F. Anti-friction metals
    1. Polished bearings
    2. Ball bearings or roller bearings
    3. Lubricants

MATHEMATICS

UNIT 9 CHARACTERISTICS OF METALS

ORIENTATION

- A. Ferrous alloys
    - 1. Percent
    - 2. Points of carbon converted to percent
    - 3. Heat treatment
        - 3.1 Time requirements for depth of penetration
- B. Non-ferrous alloys
    - 1. Percent of composition

UNIT 9 CH

ORIENTATI

	COMMUNICATIONS
	UNIT 9 CHARACTERISTICS OF METALS
cent of	ORIENTATION

LABORATORY	
F. Non-ferrous metals 1. Aluminum 2. Brass 3. Copper	

SCIENCE

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Teacher's Guide
To
Career Orientation
in
Elementary Grades

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Career Orientation Project
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Appendix A - Career Guidance: A Developmental Process
G. E. Leonard
Wayne State University

Appendix B - The Needs of Inner-City Children for Career Guidance

Introduction

In modern American schools, a student is expected to make his basic vocational choice in the ninth grade. At the tenth grade level the educational routes leading to college preparation or vocational education diverge. Thus, at fourteen years of age, probably whithout even one educational experience directly applicable to this choice, a young student is expected to make one of the most vital and important decisions of his life.

This manual is designed to help the elementary level teacher provide some of the information and experiences necessary for this decision. For most of us, this process will be one of learning along with the students. Most of us made our vocational decisions in the same way students make them today, arriving at this point in our lives without any organized information about various types of work.

The information in this manual is a mixture of several approaches to vocational orientation. Some of the information deals with the provision of simulated vocational experiences for the child. These experiences consist of in-school work and field trips. The unit-project approach is used. Stress is placed on allowing the child to do things. This approach to vocational orientation allows for a maxium amount of action with a minimum of theory. A similar project is being run in Marietta, Ga. (Cobb County School System). Many local teachers have visited this project or attended a workshop featuring its director, Mr. Joel Smith.

Other parts of the manual cover a different phase of vocational orientation. It has a more theoretical approach based on traditional vocational guidance methods. The emphasis is on provision of information and personality development. Personality development, especially the building of feelings of self-worth and dignity, has long been considered a necessary pre-requisite for any successful school or vocational experience.

Some of the material for this phase of our project was developed by the Detroit Public School System. Two articles which deal with the relationship of culturally deprived students to the school system are included in this introduction. Those of you who work with large numbers of these isolated and often rejected children will, perhaps, enjoy and benefit from these articles.

It should be noted that while one phase of vocational orientation deals with what the students do and the other phase deals with what the teacher does; these two phases are the opposite sides of the same coin. A whole and on-going program requires both parts.

The following information has been selected, compiled and in many instances produced by a committee of your fellow teachers.

Everything now included in this manual was selected by these teachers because it seemed to be useful for the task at hand. The purpose was not to produce a finished document but to start an ever-growing one. Each user is asked to contribute to the Vocational Orientation Committee any information or unit-project plans which can be added to this beginning.

In the words of Peter Drucker,....."there is a danger that we, in our intellectual arrogance....in this country and throughout the whole western world, are taking that fairly small part of the human being that is his verbal-intellectual faculty and considering it the whole man. We are in danger of becoming purely intellectual and stunting the rest of the child and the man. We are in danger, and you all know it, of believing that the abstract, the things that one can put into a book, is above achievement. But it is only promise. Achievement comes only in performance!.....I am also very concerned lest the necessary and overdue change in our opportunities for learning will lead to an even greater contempt for doing.

Verbal subjects, however important, lack one absolutely necessary ingredient for the development of the human being. Performance is not possible in them. Performance is possible only in doing."

The following outline is designed to give you, the teacher, some insight into the sorts of things that vocational orientation projects try to do and into some of the things that this will attempt.

The generally accepted goals of vocational orientation are: (1) student self-evaluation, (2) introduction to various occupational areas, (3) exploration of the various economic and social values of work, (4) exploration of the psychological and sociological meanings of work, (5) description of educational avenues, and (6) development students' decisions making ability.

Project goals and objectives include:

1. Development of student self-awareness of interests, values abilities, and personality traits. This will include recognition of liked and disliked tasks and levels of personal performance.

Objectives

   a. The student will be able to select those tasks he likes from a list of work related activities that he has performed.
   b. The student will be able to select from the above mentioned list those tasks he performs best and by the intermediate grades tell why he performs these tasks best.
   c. The student will be able to match work related activities to visible jobs in the community.

2. The student will develop an awareness of occupational choices available in the community, state, and nation. This will be done by means of a unit-projects which teach the student the types of tasks performed in various industries. Many of these tasks will be actually experienced by the student.

Objectives

   a. The student will be able to observe photographs of people at work and give their job title, contribution to the community, general skills required for the job, and the type training or education necessary to acquire these jobs.

b. The student will be able to state the locality or type of locale for all occupations where this is relevant. He will also be able to make general statements about the living and working conditions of workers in inductries studied.

3. The student will acquire an awareness that educational avenues to particular vocations exist and that they are related to school subjects. School subjects will be shown to be directly related to many of the students future vocations.

Objectives

a. The student will be able to produce a simulated work report using proper grammer, spelling, and writing principles.

b. Given a series of work situations, the student will perform the related mathematical operations utilizing mathematical concepts from his grade level.

c. The student will be able to state the pertinent health and hygiene rules associated with a series of given occupations.

4. The student will learn to deal with the economic, social and psychological meanings of work. This will include the areas of personal responsibility and teamwork. It will be stressed that all useful work has inherent dignity.

Objectives

a. The unit-project will demonstrate interdependency. Each child should be able to express why people need to cooperate and why personal responsibility is important with direct regard to any finished unit-project.

b. The student should be able to start anywhere in a chain of interdependent occupations and tell who is dependent on whom and why.

c. Each student should be able to state the usefulness to the community of any job studied and at least one desirable characteristic of that job.

5. The student will perform a series of tasks related to unit-projects. These tasks will be calculated to provide regular success experiences if the child provides some effort. This series of tasks will tend to develop a positive self-concept, an awareness of the world of interpersonal relationships. This combination of information and personality development is the basis for decision-making ability.

Objectives

a. Each student will demonstrate on a unit-project his ability to make decisions.

b. Each student will be able to select from a list of environmental factors those relevant to him.

c. Given a list of personal traits the student will be able to select from them those that best describe him.

d. Using an experienced activity the student can list his weak points, his strong points, and will discuss how his strong points can be utilized to improve his performance.

The initial question of every teacher who becomes a part of a new program in education seems to be, "How will this program affect those procedures which I have already worked so hard to implement in my classroom?" With vocational orientation the answer is simple. This program requires a minimum of two vocationally informative unit projects per teacher per school year. If the teacher likes this method of presentation and reinforcement of material, she may do more, but more is not required.

The approach to education used in this county and in nearly all school districts in this country consists of a flow of abstract material directed at the child. This flow grows in quantity and complexity as the child progresses through school. It is assumed at all stages that the child has mastered the material already presented. This material, which makes it possible for man to build bridges, skyscrapers and airplanes and produce food and clothes for billions, is presented always in a second-hand medium. It is spoken about, talked about and pictures of it are shown. A child may graduate from a modern American high school and never have used in a practical non-academic fashion anything that he has learned beyond simple arithmetic and reading.

The unit-project approach allows a sort of frozen focus to be applied to the curriculum flow. For a few hours each week the stream of abstract information ceases and the child has an opportunity to use some of that acquired information to do something. These unit-projects are laboratory periods during which the child learns to use in a practical way the academic skills he has learned.

Here, a few words should be said about what we are not doing. This is not an attempt to return to the unit method of teaching; nor is it an attempt to alter in any drastic way what any teacher is doing in her classroom. It is an attempt to introduce practical experience for the student and vocational information into the classroom. The unit-project method of vocational orientation brings with it several strong points. An opportunity is provided for the child to use what he has learned and for the teacher to see him attempt this use in a relaxed atmosphere. Research and practical experience have shown that those children classed as retardates, slow learners and culturally deprived, often learn rather quickly by doing those things which they learn only very slowly from a book.

The Unit-Project Approach to Vocational Orientation

The key person in any scheme for teaching is, of course, the teacher. We realize that many teachers know very little about many vocations. You are not expected to be or to become vocational guidance specialists.

The key to project implementation is the teacher's ability to utilize the resources of the school and the community. Training in how to use these resources and some minimal vocational orientation has already been provided for many of you. Future in-service training and workshops will include all involved teachers.

The following is a rough outline of the sorts of vocational experiences that are most beneficial at each grade level.

Kindergarten: The pre-school child may be introduced to simple tasks at school, such as putting up the toys. He may also be exposed to simple tasks that are performed at home. For example, many pre-schoolers carry out the trash or feed the family pets. Kindergarten is also the time to begin to organize the child's perceptions of the vocation more apparent to him. These will usually be sanitation workers, mailmen and firemen.

First Grade: The first-grader is ready to begin to deal with learning or education as a job. This would include the introduction of the school personnel as people who are working on a job.

Suggested Careers for First Grade Study

TV Repairmen
Plumber
Sanitation Worker
Telephone Installer
Radio Announcer
Dentist/Doctor
Construction workers
Electrician
Electrician
Insurance Salesman
Minister
Mechanic/Barber

Second Grade: The second-grader is ready to learn about the relation of education to his future work role. This would include development of an understanding of levels of job skills. The child may begin to look at his own education and toward the direction that he will take after he leaves school. (This career exploration is undertaken with the full understanding that each child will change his choice of occupations many times.)

Suggested Careers for Second Grade Study

I. Neighborhood Businesses

Large Supermarkets
Private Businesses
Churches
Recreation Facilities
Schools
Gas Stations
Others

II. People Who Work With Animals

Farmers and Dairymen
Pet Shop Owners
Veterinarians
Animal Trainers
Zoo Workers
Circus Workers
Dog Catchers
Humane Society Staff
Others

III. Transportation Occuaptions

Pulpwood Crews (movement of wood from place grown to mill)
Railroad Men
Airline Services
Truck Drivers
Taxi Drivers
Steam Shovel/Tractor Operators
Ship Crew
Others

Each job family can be studies systematically and developmentally through the use of:

* Occupational materials Audio/Visual
* Speakers
* Field Trip
* Discussions
* Role Playing
* Group Activities

Third Grade: The third grade is the time for expanding the concepts introduced at level K-2. These concepts are an introduction to jobs, to preparation (education) and its relation to skill level, and the final step leading to an examination of personal skill and performance by the student. This examination must be accompanied with extreme tact. The emphasis must be on the positive aspects of self-examination. A careful look at strengths and weaknesses of each can stimulate that child's achievement or it can be highly destructive.

Suggested Careers for Third Grade Study

These lists are merely suggestions and are cumulative. Any of the preceding lists are also considered.

I. Recreation Workers Who Help You Play

Recreation Directors
Physical Education Teacher
Maintainance
Office Staff-Switchboard Operators
Camp Counselors
Food Servicers
Others ______________________

II. People Who Work at the Zoo

Animals Trainers
Maintainance Workers
Veterinarian
Doctor
Zoo Director
Ticket Salesman
Food Salesman
Office Workers

III. Holidays Workers

Window Display Artists
Actors and Actresses (clowns, etc.)
Musicians
Commercial Artists
Interior Decorators
Seamstresses and Tailors
Public Relations - Advertising

Each job family can be studied systematically and developmentally through the use of :

Occupational Materials
Role Playing
Speakers
Group Activities
Field Trips

The pre-school and primary-level child generally thinks and works with a great deal of specificity. He tends to concentrate on the physical mechanics of hitting a nail or sawing a board. He probably thinks of himslef as hammering or sawing as opposed to making a part of some project. This type of concentration is necessary as the child develops the motor skills necessary to perform complex physical maneuvers. This simple observation does have a strong effect on the planning of a unit project. In the early grades the projects should be simple, uncluttered, and relatively short. Six hours of project time spread over two weeks is easily adequate in the early grades. The vocational relationships that are readily visible to the primary grades are: workers who use the various tools with which the students are familiar, workers who paint and workers who put things together (assembly line workers etc.). The primary level child also deals easily with the vocational tasks associated with sales occupations and the uniformed workers (firemen, policemen, sanitation workers, etc.).

The point being stressed here is simplicity. Start with occupations familiar to the child.

Develop the project around one type occupation. Plan so that the child will get to perform some tasks of the same type as the worker being studied. For example, most schools provide an excellent opportunity for a project on sanitation workers, maintenance work, or food services. There are usually on-campus experts in each of these field readily available to the teacher. As the project is nearing its end and the students already have firm ideas about the vocational tasks performed by the worker under study, it is time to bring in related occupations. These are occupations that are like the occupation studied. The relationship should be specific. The kep concepts here are singularity (most primary level children learn best if only one type of thing is presented at one time) and specificity (concrete examples of all vocational relationships should be used). For example, a night watchman and a policeman are alike because they both guard things or people, they both walk or ride a beat, and they both wear uniforms.

As we move into the intermediate level classes the child becomes a more complex creature. Many of the same topics covered earlier in an individual fashion can now be re-presented with the stress on the interrelatedness of various vocations. For example, a project on cotton may deal in some depth with farming, the social implications of farm labor, the textile industry (working models of looms and cards are especially easy to build), labor unions, cost estimation, production problems, the dependence of one industry on others (production of steel, machine manufacturers, transportation etc. all effect the textile industry), and the various retail outlets ofr textiles. One project of this sort allows several teachers to work on various aspects of it with their classes for a whole year. The cooperation of several classes on one project will demonstrate the need for and the difficulties of cooperation in a complex industrial society.

It should now be evident that the focus of vocational orientation at the intermediate level is shifting toward a view of the societal role of various occupations from the primitive, tool-user concepts of the primary level orientation.

The following is a suggested outline of intermediate level concepts:

Fourth Grade: The fourth grade child is ready to deal with the concepts of schedules, punctuality, dependability, and qualifications necessary for specific jobs.

These concepts have been touched on in the primary grades but have not been fully explored due to the maturity level of the children. The children may be introduced to the need for schedules, punctuality, and dependability by talking about such home-jobs as feeding pets, helping prepare meals or baby-sitting younger brothers and sisters. The next step would be to carry these concepts over into the child's involvement with the school, showing the need for schedules, punctuality and dependability in school. The final step is, of course, the demonstration of these concept's application to industry.

The theme of job qualifications is a key one which will be pursued through the entire intermediate section. The easiest and simplest demonstration of job qualification is the graded school system. If each grade is considered as a job, then the subject matter learned by the child represents his qualifications for advancement. The area of job qualifications also includes such things as size, age, and sex. For example, some work is considered "woman's work" or "man's work."

Questions such as these may be helpful for discussion:

"What are some jobs that you do at home?"

"Which jobs do you like to do?"

"Which jobs are the kind you like to do the least?"

"Why do we like some jobs?"

"What is it about them we like?"

"Do we laugh at some jobs because other people laugh at them?"

"Do some people have jobs that others may not respect?"

"How should we feel about all jobs?"

Questions to guide discussion:

"Name some jobs that might be done at a specific time."

"Name some jobs that can be accomplished whenever it is convenient."

"Discuss what is meant by punctuality."

"Why is it so necessary to be on time for school? For an appointment? For work?"

"Do other people expect you to be dependable?"

"How do you feel when you know you have been dependable, worked hard, and completed your task well?"

"How do others feel about you?"

WORK AT HOME

Name some jobs that you do at home.

Why do you like some of these jobs?

Why don't you like some of these jobs?

WORK IN SCHOOL

Name 10 different jobs in your school

Which of these jobs do you have?

Which of the jobs on school would you like to have?

JOB STUDY

Materials Needed:

The teacher should have available many and varied reading and picture materials about jobs, careers, and occupations for the use of the children. The guidance consultant in each school will suggest any information and assist each teacher.

Books from your own school library
Films from school system
Films and filmstrips from the Developmental Career Guidance Project
Encyclopedias

Pictures from the Children's Art Museum

Magazines

Dictionary

The "I Want To Be Books," Children's Press, Inc.

Junior Occupational Briefs, Science Research Associates, Inc.

Newspapers

Role Models

Fourth grade children are usually ready to understand job classifications as complex as the following list:

Professional

Semi-Professional

Services

Skilled

Unskilled

Be very careful to associate job qualification and salary without prejudical viewpoint

WORKSHEET

I. Occupation or job____________________

a. Description of job____________________

b. Tell some of the things you do on this job____________________

____

____

c. Why you might want it____________________

____

II. What does it offer

a. Chances of future employment____________________

b. Salary ranges____________________

c. Rewards - not money____________________

d. Penalties____________________

e. Further learning on the job____________________

f. Hours to work, vacations____________________

III. What is needed to get the job

a. How much education is needed____________________

b. Physical needs____________________

c. Type of person that can do this job____________________

IV. Interests

a. What steps do you have to take now so you might get this job in the future?____________________

b. What are you already doing to help yourself?____________________

c. School subjects needed for this job____________________

After giving a few days for the study of these jobs, the children should share their information with others. Some of the ways this could be done are:

1. Each child pick one of these and tell the class.
2. Have each child compare the 3 different work sheets and see the likenesses and differences.
3. Divide the class into small groups and within each group have them share their learnings.
4. Choose some of the children that selected unusual jobs and have those reported.
5. Make a list of all of the different jobs chosen and let the children select those they wish to hear about.
6. Have report given showing the 5 catagories discussed - Professional, Semi-professional, Services, Skilled, Unskilled
7. Make a booklet of all worksheets.

Allow for those children that wish to do other things with their information; art work, writing, further research, role models into class, etc.

Beginning with the fourth grade the occupations or industries chosen for unit-projects will be limited primarily by the teachers resourcefulness instead of the limitations of the students.

Fifth Grade: The fifth grade child is generally ready to once again expand the complexity of his concepts about job classification. The classification presented here are standard U. S. Department of Labor notations. This will enable the teacher to easily use such documents as the Dictionary of Occupational Titles if she desires.

These classificationa are: in descending order-

Professional
Clerical and Sales
Services
Agriculture, Fishing and Forestry
Skilled
Unskilled

It is now time to introduce a concept that is too often glossed over in modern education. All work is not pleasant. Some work requires long and tedious preparation, some work is physically hard, and some work includes considerable mental strain. The type of difficulty generally varies with the job level.

A number of concepts branch out from this central fact. They may be considered in any order that the teacher chooses. It seems logical to start with the question, why do people work? The class should be able to give many answers to this question. The concept here is that directly or indirectly (through money) work provides things that make people feel good. A second question for class discussion is, what decides how much people work? The concepts being that amounts of work are tied to various jobs and to the economic and/or social needs of people.

As the discussion becomes more specific, the question can be asked, what decides which particular job a person has? Here the answers depend on one's viewpoint. This event may be related to one's strength, intelligence, social-economic background or ones wants and needs.

It should be made clear at this point that no one person could be successful at all jobs. Each person must go through a selection process. Each job has both

882

pleasant and unpleasant parts.

Note: Atheletic coaches have long used the phrase "paying the price" to describe the unpleasant parts of atheletics. The price for atheletic success is the willingness and ability to put in many hours of hard practice in order to compete for a few minutes or even a few seconds. The price for job success may be long years in school or long years of drudgery at low level jobs as one slowly works toward a goal.

In dealing with the pleasant-unpleasant view of a job, the critical ratio is the relative amount of each factor available. In other words a satisfactory job choice balances the amount of each of these factors.

This is a good place to point out once again the relationship between certain parts of the curriculum and certain jobs. This discussion should include both the need for certain subjects as part of the "price of a certain job and the job-choice factor of the student's like or dislike of parts of the curriculum.

It should be obvious to the teacher that we are once again dealing with some aspects of self-evaluation. This process should be pleasant. Strengths should be emphasized. Things enjoyed should be emphasized. Opportunity should be emphasized. A negative, restrictive self-evaluation or teacher evaluation is harmful and destructive. If this process becomes one that says to the child you can't do this because etc; the child is better off without it.

Worksheet

Name 3 jobs or occupations for each of these classifications:

Professional__________________________

____

____

Clerical and Sales__________________________

____

____

Services_______________________

____

____

Agricultural, Fishing and Forestry_______________________

____

____

Skilled_______________________

____

____

Unskilled_________________________

____

____

A study for this grade level would be the introduction of each area of the curriculum and the jobs which would be pertinent to that subject. For instance, some of the occupations related to the language arts would be:

Lawyer
Secretary
Radio Announcer
Dramatic Critic
Librarian
Proofreader
Sales Person
Clergyman
Advertising Mgr.
Sales Clerk
Editor
Hostess
Salesman
Author
Copy Writer
Customs Clerk
Sports Writer
Teacher
Translator
Actor
Tutor
Printer
Cryptographer
Interpretor
Buyer
Speech Therapist
Journalist
Telephone Operator

Helpful to the teacher to better prepare themselves for this would be the book:

The Teacher's Role in Career Development

by W. Wesley Tennyson
Thomas Soldahl
Charlotte Mueller

The Guidance Consultant in your building will locate this for you. Not only the jobs involved but the related areas of study should be discussed. An example would be the Language Arts. This would include reading, handwriting, spelling, and English.

Discuss the concept that some jobs require many areas of curriculum.

An example would be a sales person. They would need the language arts and mathmatics. Have the children think of the other jobs and the other subjects necessary.

DO DO: WORKSHEET

WORKSHEET

AREA OF CURRICULUM

How do you do in this subject?

Why study this subject?

Jobs relating to this subject: ______________________________

____

____

____

____

____

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WORKSHEET

I. Occupation______________________

a. Job____

b. Nature of work____________________________________

c. Duties to perform_________________________________

d. Why you might want it_____________________________

II. What it Offers

a. Present chances for employment_____________________

b. Future of this job_________________________________

c. Advantages of the job______________________________

d. Disadvantages of the job___________________________

e. Importance to self and others______________________

III. Working Conditions

a. Salary____

b. Hours____

c. Vacation____

d. Further training or education______________________

IV. Requirements

a. Education needed___________________________________

b. Type of person for this job________________________

c. Physical needs_____________________________________

V. Interests

a. Steps you take now to help yourself________________

____

b. Where you got your information_____________________

____

Sixth and Seventh Grades: The sixth and seventh grade children have already been introduced to the necessary concepts. These grades are primarily a time for increasing the depth of the child's understanding of the vocational world.

A brief review of the concepts covered in previous grades is in order here. The career lists which the teacher may find useful are included in each grade level. They will not be reprinted here.

The primary level is a time for browsing. The child is introduced to work through example. He is shown various people doing many different things and is told that these things are work. The occupations with which he is familiar begin with the highly visible ones (firemen, policemen, etc.) and slowly expands. The concepts of school as work, of job levels, of job requirements and of personal achievement are introduced. The child is given the opportunity to use and to begin to understand simple work tools. A very gentle attempt is made to relate the child's present school performance to his future job choice and to encourage a positive self-evaluation.

At the intermediate level, vocations are dealt with on a much more realistic level. The concepts here are punctuality, dependability, job qualifications and the interrelatedness of jobs and people. The list of concepts also includes the factors that relate to job choice, the rewards and penalties associated with various jobs, the relation of school performance to future job choice, and a more intense but still highly positive self evaluation.

The above concepts should be very familiar and confortable to the child by the end of the seventh grade.

The unit projects attempted at this level will be much more complex with the emphasis on planning and execution. The instructor may want to extend one project over an entire year at this level.

TO THE TEACHER   CHARACTERISTICS OF A GOOD WORKER

The teacher can discuss these or perhaps the children can recite these.

1. Enthusiasm
2. Neatness, orderly, punctual
3. Good Health
4. Show initiative
5. Finish what you start
6. Follow a schedule
7. Make up work missed
8. Practice larger vocabulary
9. Do better today than you did yesterday
10. Think about what you are doing
11. Know what you are doing--ask directions
12. Be active in classroom activities
13. Use what you are learning
14. Realize you are not always right
15. Have opinions and talk about them

ACTIVITY Have each child rate themselves on each of these.

EXCELLENT   GOOD   POOR

WORKSHEET

List some of the things about yourself that may help you decide about your future career. An example would be your marks in school in certain subjects.

Make this list as long as possible.

WORKSHEET

What job do you think you may want to do when you finish school?

Why do you think you will like this job?

What subjects will you need to do well in school to better train you for your job?

Will you need more training for this job after finishing high school?
Explain this training as well as you can.

WORKSHEET

List the reasons why people work.

WHERE WILL YOU LOOK FOR A JOB?

The teacher can start discussion by asking:

"Where will you look to get this job?"

Some of the ideas that may be suggested by the children:

1. Parents
2. Friends
3. Relatives
4. Want Ads
5. Yellow Pages Directory
6. Employment Offices
7. Go to the place where they have these jobs and ask for one.

(This would make an interesting bulletin board for the children to show the places to look for a job.)

Each of these ideas suggested by the children should be elaborated.

Parents:

"Should you discuss the job you may want with your parents?"

"How can they help you?"

"Will they help you?"

(These two questions may be somewhat "touchy" to be discussed in front of the whole group but they can be of great importance to the student. Some boys and girls may be able to talk to their parents, while others may find this almost impossible. Discussion should be encouraged.)

Friends:

"Will friends by of help to you in getting a job? Will they know of jobs available? of places to look?

WANT ADS:

"How can the want ad section of the newspaper help you find a job?"

Supplementary Study for the Teacher to Use

Further discussion on how to make better use of the want ad section of the newspaper can be developed by the teacher.

Some children do not have newspapers available to bring to school.

If they do have these at home, encourage them to look them over and bring them to school.

The teacher can give to each child one or two want ads or show them on an overhead projector. Encourage the children to make observations and share these with the class.

Questions to Guide Discussion:

1. How is the part in the want ad section for people looking for a job divided? (jobs for men and jobs for women)
2. Why are some ads larger and some smaller?
3. Do they have any that advertise for more than one job?
4. What do they show or ask for in the ads?
5. If you want a job can you put an ad in the paper?

Additional Communications Activities:

1. Have the children look for want ads that may have jobs they might want to apply for.
2. Those interested could write their own ads. They can pretend they are a company and need some workers.
3. Writing a letter in answer to a want ad would be of great value for spelling, handwriting, letter writing, etc.

Yellow Pages of the Telephone Book:

"How can the Yellow Pages help you find a job?"

(This may be a more difficult concept for the children to understand. Having one or two in the room to share would be helpful.)

"What information would the book show?"

"Do you think the newspaper want ads or the yellow pages would be the best to use?"

(Since this can be a matter of opinion, some of the pupils may realize that it depends on what they are looking for to fully answer this question.)

Employment Offices

"What is an employment office and how can it help you find a job?"

(Very few of the children will know of this source of help. The teacher may not wish to discuss this too deeply. However, they should be aware that such an agency exists.)

ACTIVITY:

A field trip to an employment office would be of value.

WORKSHEET

I. OCCUPATION

a. Job description____________________

b. Nature of Work____________________

c. Specific Duties____________________

d. Reasons for Considering it____________________

II. WHAT IT OFFERS

a. Present Outlook____________________

b. Future Outlook____________________

c. Work Environment (Physical and Mental)____________________

d. Advantages of Job____________________

e. Disadvantages of Job____________________

f. Importance to Society____________________

III. QUALIFICATIONS NEEDED

Age____________________

Male or Female____________________

Height and Weight ____________________

Physical Requirements ____________________

Education ____________________

Other Training ____________________

Type of Person-Likes or Dislikes ____________________

IV. WORKING CONDITIONS

a. Hours ____________________

b. Days of the week ____________________

c. Vacation ____________________

d. Salary ____________________

e. Advancement ____________________

f. Hazards to the job ____________________

V. READING YOU DID TO FILL OUT THIS FORM:

____

____

____

VI. HOW DO YOU FEEL ABOUT THIS JOB? WHAT ARE SOME THINGS YOU WILL HAVE TO DO TO HELP YOURSELF? ____________________

____

____

____

____

1. LIST SOME OF THE REASONS WHY JOBS MAY CHANGE IN THE FUTURE.

2. NAME AN OCCUPATION OR JOB THAT WE DO NOT HAVE NOW.

3. WHAT JOBS ARE GOING TO REALLY BE NEEDED IN THE FUTURE?

Your Appearance

"You have now looked for a job, decided why you want a particular type of job and decided how to get there. What other things should you think about before going to apply for the job?"

One of the children will mention clothing and how to dress. The teacher can develop this with the entire area of personal appearance because jobs can be won and lost on appearance.

Some items to discuss would be:

1. Be sure you are clean, self, nails, clothing, teeth.
2. Think about your posture - head up. shoulders back, your back should be straight.
3. Think about how you walk - walk as if you feel happy, not dragging your feet.
4. Think about your clothing - clean, neat, pressed, buttons on, zippers zipped, color, harmony.
5. Look at your hairstyle - combed, clean, not in eyes.
6. Think about the expression on your face - cheerful, alert.
   When you meet someone for the first time, you judge them be their entire appearance. Certainly an employer will do so, also.

ACTIVITIES

Have the children role play each of these items of appearance showing the right and wrong way. Discussion of current fads will be of importance.

Draw posters of these.

The Written and Oral Interview

DISCUSSION

There are usually two types of interviews, the oral interview and the written. The written form is usually an employers application form.

Have the children tell what might be included on such a form.

Refer to the form used in early elementary pages of this book for a beginning.

Further examples:

Name
Date
Age
Address
Telephone Number
Social Security Number
Education: Subjects
Interests

Military Service
Schools Attended
Marital Status
Previous Work
References
Physical Background

ACTIVITY

Each of the areas mentioned should be talked over. Have the children make up a simple application form, and let each of them pretend they are applying for a job they want. They should fill out this application form.

The teacher can ask the boys and girls to discuss some of the questions that might be asked at the oral interview.

After some discussion have the children role play this. Some of the development of each part of the written application form. (Many items have been left out of these forms for the elementary school child. However, they may think of many other things that might be on an application form). Encourage the children to bring application forms from home.

ACTIVITY

The teacher could write some companies for forms or have the children write for them.

DISCUSSION What will you say?

"You are now ready to apply for a job. When you get there, you are looking fine, you smile, and you walk in. How will you approach the secretary? What will you say? What will you do?"

The children can role play this with many and varied approaches.

Some ideas that could be presented would be:

1. Smile and introduce yourself
2. State why you are there
3. Don't talk too much
4. Speak slowly, clearly, and loud enough
5. Be sure you are not chewing gum or candy
6. Firm handshake if interviewer offers his
7. Stand until asked to sit
8. Answer questions honestly
9. Sit quietly and wait
10. Act enthusiastically

The Unit Project: This section will first consider the classroom process used for a unit and then describe the formal organization.

The class and teacher will generally decide on a project together. It will probably be necessary for the teacher to exert some subtle guidance in order to limit these project attempts to those within reason.

Committees of students are chosen to study various aspects of the project. The types of committees will vary with the project. In general there will be committees that: set up lists of jobs related to the project (the jobs may or may not be categorized depending upon the grade level), gather information needed for the project, make plans with regard to space available for the project, cost, and time needed. These committees will be performing task that are equivalent to the tasks performed on most executive jobs. Each child should have a part on one of these committees. There should be a management committee in charge of keeping the project moving, and workers committees which actually construct the project. Each child should have a chance to supervise and to actually work with tools.

The teacher will want to work in readings, resource people, and discussions during the project. A well rounded project will enable the teacher to use social studies, mathematics, English, and science in the project.

It should be reemphasized that these projects may be worked on a few hours a week or more often depending upon how well the particular project fits into the total range of subjects being taught.

The following is an outline of a well developed unit project:

I. Purpose

II. Objectives and Concepts

    A. Objectives

        1. General

        2. Behavioral

    B. Concepts

III. Subject Matter

  A. Brief History of Subject

  B. Classification (this shows the major divisions of the subject)

  C. Workers (these are generally classified according to the divisions shown in item B)

  D. Equipment

IV. Motivation

V. Study Activities

  A. Initial Activities (relate personal experience etc.)

  B. Research Activities (These will be your student committees and resource people)

  C. Correlating Activities

    1. Language Arts

    2. Arithmetic

    3. Art

    4. Science

    5. Social Studies

    6. Music

VI. Material & Tools

  A. Materials

    1. Consumed

    2. Resuable

  B. Tools

    1. Portable Shop

    2. Special Tools

VII. Construction

VIII. Culminating and Follow-up Activities

IX. Evaluation

- A. Self-evaluation
- B. Observations of the child
- C. Written Tests
- D. Oral tests
- E. Performance tests (ability to use certain tools in a safe fashion and recognize the proper tools for various jobs)

X. Bibliography

Role Playing: This simple game or counseling technique is one that is completely natural to children. If left to themselves, children will act out the roles of many different people with whom there have been recent interactions. Adults tend to consider these activities as idle play or "make believe." This underestimation of the importance of the child's acting out his emotional experiences can be most serious. During childhood the decision is made by the child either to basically trust his fellows or not to trust them. The former path leads in general to an open, happy, mentally healthy life while the latter path lead all too often to neurotic alienation and unhappiness. The key to the issue lies in the reaction of the people that are close to the child to experiences that are emotionally important to him.

The following material is drawn from Guidance in the Elementary Schools by Martinson and Smallenburg:

> The use of stories and classroom situations that provide opportunity for dramatization is commonly called role-playing or sociodrama. .. ...children have an opportunity to work out spontaneously....problems that are of concern to them as a group. Jennings defines sociodrama as an intensive vivid, loving through of experiences of common concern to the group members-experiences which may have been cut short in life and blocked from full expression, leaving unresolved, buried emotional impact.[1]

Reaction stories, unfinished stories, and role playing are discussed together here because several criteria for successful use apply to all. In order to provide for spontaneity and successful, emotionally healthful learning these factors should be considered:

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[1] Helen Hall Jennings, "Sociodrama as Educative Process," in Fostering Mental Health in Our Schools (Washington, D. C.: National Education Association, 1950), p.260.

1. The teacher and her total attitude must be accepting, permissive, and non-critical. The children must be able to be themselves without adults' judgement. Correction of the children's grammar or choices, or the expression of personal opinion should be avoided by the teacher. This acceptance of the childrens actions and ideas is one of the teacher's most difficult problems. Children should be allowed to make choices and work out the proper solutions themselves.
2. The situation must be a representative problem of the group. It should appeal to the majority without singling out individuals in the group with intense emotional impact.
3. Participation in the discussion or dramatization should be voluntary. Participants should be encouraged to act and speak with complete freedom. The teacher should not push for insights but be willing to wait.

The following steps and procedures have been listed by Jennings, Moreno, Shaftel,[2] and others.

1. Study needs of the group and choose situations applicable to needs.
2. Through vivid discussion, through curtailing a story at a crucial point, or through a dramatic incident, stimulate the group so that they want to learn the best ways of coping with a situation.
3. Sensitize the children to their roles by telling them that they will be asked to take parts.
4. Clearly define the problem. The class members speak of their own experiences and add to the dramatic possibilities.
5. Select children to play roles. Little time is involved in planning so that the action remains spontaneous and uninhibited. *The dialogue*

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[2] Fanny and George Shaftel, *Role Playing the Problem Story* (New York: National Conference of Christians and Jews, 1952).

is never planned.

6. Prepare the audience to observe intelligently and alertly. Remind the children that they will have opportunities to replay the situation, and that they are looking only at the roles, not at the child personally. They should understand that mistakes can be made and accepted, and that more than one answer is possible.
7. During the discussion, have the children define the problem, consider alternative action, weigh the consequences of each choice, choose new possibilities, and gain deeper insights.
8. Follow through with new enactment and new planning if needed.

APPENDIX A

Career Guidance: A Developmental Process

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Of all the variables measured in the recent U.S.O.E. survey reported by James Coleman in Equality of Educational Opportunity (2), "the attitudes of student interest in school, self-concept, and sense of environmental control showed the strongest relations to achievement". Certainly these student attitudes are of prime concern for the school counselor at every level -- elementary, junior high, and senior high. Certainly facilitating the healthy development of these attitudes should be primary objectives of any guidance program. Certainly activities designed to aid the development of self-concepts and above all to aid students to gain a feeling of control over their own destiny should form the backbone of any fully-functioning guidance program. Certainly these psychological factors should be considered part of the theoretical framework which should undergird any guidance program.

In how many cases, however, do we find any sort of rationale for the activities being carried on in guidance programs? I would submit that in far too many cases we are ruled -- just as absolutely as too many of our students -- by the tyranny of the immediate. In other words, we carry on the day-to-day activities we have carried on and, in many cases, that those before us carried on, without ever thinking about why we are doing whatever it is that we are doing. Operating in this fashion is analagous to traveling through strange territory without a road map which not only helps to guide our activities, but also helps us to see where we've been, thus making it possible to evaluate the effects of our activities. Yet, I would submit that in too many cases this aimless procedure is due to nebulous constructs that are very difficult to translate into practical terms. For example, let us look at self-concept -- which I mentioned earlier as one of the crucial factors in regard to achievement. I wonder what this psychological construct really means to most of us. I wonder further what programs and what activities have been designed and are in operation to provide for the development of better self-concepts. My point here is that self-concept, despite the fantastic number of studies dealing with this construct, is a nebulous one when we attempt to make this operational.

Let us next examine the attitude of "sense of environmental control"-- also mentioned in the Coleman report. What programs can we, and should we, implement to improve this sense of environmental control? More importantly, what programs have been implemented?

We could, of course, go on and on and on in reviewing certain constructs that are beautifully high sounding in theory, but do not seem to be of much help in aiding the establishment of meaningful guidance practices designed to aid youth in becoming all they are capable of becoming. We hear a great deal about freedom in the guidance literature these days -- especially in the philosophical aspects of guidance theory. But how are we to help the _individual_ achieve freedom? And what kind of freedom? And how are we to help individuals _feel_ a sense of freedom? Timothy Leary, the prophet of hipsterdom says that, "... freedom to do your own thing is the backbone of the new love revolution." I would submit that the freedom students are seeking is the freedom of choice -- and especially as it affects their future.

For far too long we have measured freedom for students in terms of allowing them, forcing them, encouraging them to make a vocational-educational choice at some time in their educational career. At the end of the eighth grade in most cases, students have to make some kind of choice regarding several elective subjects in the ninth grade. In most cases this process is a "happening" that takes place within 10 minutes, an hour, possibly a week. Then, the "happening" is over -- a pretty short-lived "trip" -- until some time later in the student's high school career when again he might be asked to make a choice. In the case of most students, in fact, career development is just such a series of unrelated events. Someone comes to you, asks you, "What are you going to be when you grow up?" The student gives an answer that satisfies the questioner in one way or another and goes on his way. The culminating event is usually one wherein a father takes his child into a room and closes the door with the pronouncement, "Well, Johnny (or Janie) we've got to have a serious talk."

In most cases the child thinks, "On no, here we go with the birds and bees again." But to his surprise the question this time is, "We have to make some kind of decision about what you're going to be." The decision they come to is usually transitory in nature, but it does satisfy the parent and takes the pressure off the child.

For far too long we have accepted the concept of vocational guidance as taking place at a point in time wherein an individual comes to a certain age and then -- at that precise moment -- chooses a career. This concept originated with Frank Parsons at the Boston Breadwinners Institute soon after the turn of the century. Unfortunately, too many guidance workers have not progressed beyond that point.

We now know that career development takes place over a period of years; and that a person's previous experiences significantly influence his vocational choice. Seen in this context, then, the actual career decision, when it occurs, is but the culmination of a continuous, continuing series of choices that begin with birth, as Super (9) has pointed out.

We know further that when as individual has some knowledge of his interests, abilities, aptitudes, and attitudes, and when he is provided with some information on the world of work, there appears to be more crystallization of career goals, planning and choice. The child's attitude towards himself, moreover, will influence his perception of tasks confronting him as well as his perception of the future.

Most teachers, as well as parents, are quite aware that a child's previous experiences with a task will influence his thinking when that task, or a similar one, once more presents itself. Further, a child's needs, as well as his previous experiences in related areas, will also influence his performance with that particular task. The implications are clear: We must aid our students to gain experience in reality-testing as well as self-knowledge so they may grow toward vocational maturity. In essence, we must help our students to fantasize about many different occupations, help them gain experience in playing different types of roles, and to become aware of the many different factors to take into account when making a choice. For example, opportunities to learn about the rules of work and to have work-related experiences, are, for the school child, vocational development opportunities of major importance and ones that will influence the child's later reaction to work or to work related situations. Behavior, we know, is purposive and acquires its meaning in a social setting. As the significant longitudinal studies at the Fels Research Institute (6) and by Super's continuing research with the Career Start Pattern have shown, behavior during the early years is highly predictive of later adult behavior.

We know, therefore, that opportunities we may give to school children to grow in self-reliance and independence and to help them become involved with real work experiences is related strongly to the development of individuals.

Again, the implications for guidance practice is clear; an organized program to aid students to progress toward their future career goals is a necessity if we are truly to help children make their future dreams a reality.

A framework around which such a program could be organized would naturally have to take into account the vocational development tasks a child has to accomplish. These, as Super (10) has conceptualized, are as follows:

Vocational Developmental Tasks

To Learn:

Elem.
- Dependency
- Independence
- Social Interaction
- Industriousness
- Goal Setting
- Persistence

Jr.H.S.
- Socialization
- Coping with School
- Dealing with family attitudes and values
- Developing own attitudes and values
- Passing school subjects

Sr.H.S.
- Choosing curriculum
- Developing study habits
- Making tentative educational-vocational choices
- Implementing self-concept

Once these are taken into account, it can be seen that the vocational developmental opportunities presented to an individual are also crucial. The following opportunities can be seen to be of importance:

Vocational Developmental Opportunities

Opportunity to:

Elem.
- React to parental handling and attitudes
- Explore environment
- Develop peer relations
- Develop authority relationships

Jr.H.S.
- Learn about world or work
- Develop attitudes toward school and school subjects
- Have after-school work experiences

Sr.H.S.
- Academic exploration
- Occupational exploration
- Social role exploration

It can be seen that aiding children in taking advantage of their opportunities will aid them to progress in their self-understanding. A child can be meaningfully aided to understand himself, to accept his strengths and liabilities, and to develop a wholesome attitude toward himself. It might very well be that the most important item in any program of career development is the facilitation of the development of a positive self-concept as it relates to occupational choice.

An organized program to further career development in the junior high school is a must if we are to fulfill our obligations to boys and girls, if we are to truly help youth become all they are capable of becoming. Further, if such a program is to be effective, it must be organized and co-ordinated. The classroom teacher and the guidance specialist must work as a team in providing this service. It is never too early to start. Too often, it is too late. As Van Hoose and Leonard have stated:

> Vocational guidance is necessary to the task of socialization, i.e., preparing young people to become functioning and contributing members of society. Socialization is more than just helping the child learn to get along with others and to become an effective part of our society. Socialization refers also to the process through which a person utilizes his talents, his abilities, and his skills for the good of himself and for society. In our competive society, we expect and, except in unusual cases, demand that each individual make some contribution. Work is essential, and if a person is to find his place in life, he must be prepared to function as a worker. ....school children can be helped to understand the importance of work and the effects of work upon their lives. (11)

A developmental approach to counseling wherein all students are aided to develop to their utmost is necessary and more effective in meeting student needs. Most students appreciate professional help in their development and we are quite possibly in error when we provide counseling only for "problem" students who desire counseling for a particular purpose at any time.

In order to accomplish this, however, we must have a theory -- whatever that theory may be. As I see it, the most significant development of the past several decades in the field of guidance and counseling has been the organization and creation of career development theory. There are many variations of career development theory as articulated by Bordin, Ginzberg, Holland, Pepinsky, Roe, Tiedeman, and Super among others. I am not suggesting that career development theory is the only theoretical approach or that utilization of career development theory means that the entire guidance program will be oriented towards helping youth to choose careers: I am suggesting that utilization of career development theory as a rationale for the guidance program can give us a road map to guide our activities with pupils, teachers and parents.

We can -- and must -- carry on activities designed to aid the intellectual, personality, and social development of pupils. Vocational Development, however, as a focus for guidance seems uniquely appropriate.

The Developmental Career Guidance Project was initiated in 1964 in order to help young people become better able to take their places as worthy, contributing citizens in our society. Far too often, inner-city youth are unable to do so because of various causative factors that have blunted their growth potential. Indeed, by the time many inner-city youngsters reach adolescence, a feeling of hopelessness and futility regarding their position in life has already become evident.

Consequently, the Developmental Career Guidance Project has attempted to aid individuals to become more aware of themselves and their possibilities in their world. Objectives of the Program specifically are:

1. To broaden the perceptual field of inner-city youth regarding occupations and opportunities.

2. To help overcome their lack of planning for the future. To help them make realistic plans for their future. Since so many youngsters desire immediate gratification of their needs, this is a difficult task. Furthermore, inner-city youth must be told the truth about opportunities so they can plan realistically for the future.

3. To provide better role models with whom inner-city youth can readily identify.

The Program has been designed to progress in several phases as follows:

Phase I, Preparation for a Demonstration Project, consisted of a preparatory workshop for school personnel from an experimental region in inner-city Detroit. The objectives of the workshop were:

a. To stimulate participants to develop a total guidance program in their own school.

b. To prepare them to serve as an advisory committee to the guidance consultants who were placed in each school as part of Phase II.

c. To broaden participants' knowledge of the community.

d. To help participants better understand and communicate with inner-city youth.

e. To realistically acquaint participants with the present employment outlook.

The over-all goal of the preliminary workshop was to help participants view the school and community in terms of all available resources to help raise the level of aspiration of inner-city youth and help them acquire the skills and knowledge that would not be available to them otherwise.

Phase II, Career Guidance in Action, began in the fall of 1965 when a guidance consultant was placed in each participating school to assist the workshop team to implement the program. This consultant, under the authority of the school principal, has specific duties not connected with administrative functions. He fulfills a leadership role in arranging for frequent career conferences, serving as a liaison person with the community (employment service, Urban League, labor unions, block clubs, Neighborhood Services, etc.) in attempting to develop job openings, encouraging group guidance services and individual career counseling, arranging field trips, etc.

Workshop teams have continued to meet monthly with guidance consultants and project staff and are fundtioning as an advisory committee as well as helping to facilitate the work of the guidance consultant. The project staff is continuing to meet with participants and has arranged for additional needed consultants to implement the program.

Because developmental career guidance is an on-going process, stress is continually given to developmental aspects of career knowledge; aspiration, choice, and planning. Stress is also given to the ever changing nature of society: the world of work, social forces and institutions, and educational preparation for adult life. Furthermore, there is an emphasis on guidance and counseling based upon our knowledge of developmental patterns of people.

Guidance thus oriented is conceived of as dynamic, contiguous with growth stages, relevant to the world of work, and integrative of old and new experiences. Such a conception is continually related to what happens to the growing youngster in his classroom, peer group, and home life. It is not seen as simply the province of one educational helper, the guidance counselor. Rather, all those people and learning experiences which contributed to the development of the child are included.

Career, as a center of interest around which to build a curriculum and guidance program is uniquely appropriate. Almost every school subject, every physical, social, and mental skill, every structured or unstructured education experience can be related to career planning, either directly or indirectly.

The need for a broader spectrum of experiential knowledge among culturally disadvantaged youngsters is obvious if they are to participate equally in the advantages of our affluent society and if the forces which prevent such upward mobility are to be mitigated. Low levels of aspiration, poor self-concepts, lack of adequate academic and social skills, decelorating scales of motivation: these and many other characteristics found among youngsters whose lives begin and take shape at the bottom of society's social structure have been described again and again. It is among this segment of our population that our project has greatest significance.

Consequently, the most prominent and over-riding objective of the program has been and continues to be the increased awareness of all phases of work and career choice in every child in every school in the project. An all-embracing effort has been made to create an atmosphere in the project schools where an understanding of the world of work and of career demands is unavoidable. Building upon whatever base exists in the young child as he enters school, the DCG Project is designed to add work knowledge and experience, *in proportion commensurate with the child's ability to absorb*, as he rises through successive grades.

A second dominant objective of the program is to help every child to develop a realistic and functional awareness of himself as a worth-while human being. Individual potential, attitudes, values, skills, aspirations, interests, aptitudes, perceptions, relationships, self-images are all focal points.

A third major objective is to inform, involve, and coordinate all significant others who help mold the personality of each child into a smooth-working team. Common understandings, interests, and points of view are sought. Thus, interaction between groups and among group members is vital, and effective communication is a constant concern.

SPECIFIC ACTIVITIES

The specific activities which have been carried on in the DCG Project fall into the following categories:

I. Counseling

A. Individual vocational career counseling: students have been encouraged to seek understanding of themselves through individual conferences. They have been helped to examine themselves and to broaden individual perceptions.

B. Group counseling: selected groups of children have been organized and worked with in scheduled conferences. Counseling has focused on common problems, perceptions of self and others, reality testing related to school progress, development of social skills, examination of vocational aspiration and interests, and examination of attitudes and values.

II. Dissemination of information

A. Individual classes: consultants have worked with each individual class and classroom teacher in the school to effect a process whereby children's individual understanding of educational and occupational opportunities is broadened.

B. School activities: consultants have attempted to stimulate exploration of the educational-occupational world as well as the self world through all such activities as assemblies, etc. The end of these activities has not been to have individuals make premature vocational choices, but to emphasize the importance of future and career on self-development.

III. Broadening of perceptions

A. Field trips: in each school, field trips are made to over 50 cooperating industries wherein students have been helped to gain more knowledge of occupations and requirements. Further, they were helped to talk with, interact with, and observe workers, thus giving them the opportunity to meet with and identify with a more varied range of workers than those with whom they ordinarily came in contact.

B. Speakers: speakers from various professional, technical, white-collar, and skilled areas were brought to the school to allow students to have close contact with them, and in general, to find out first-hand about the world of work. Speakers have also served as role models.

IV. Work with parents

A. Informational: consultants have organized and worked with parent groups to help inform them of educational and vocational training opportunities and ways and means to take advantage of these.

B. Advising: consultants have aided parent groups in finding the best ways and means to help their children develop in a healthy fashion.

V. Work with community

Consultants and community aides have fashioned close liaison with community agencies and neighborhood organizations to help coordinate school and community efforts and services. A comprehensive, unified approach to helping school children has been sought.

VI. Consultation services

Guidance consultants have served as resource persons for students, school staff, parents, community and industry. University consultants served the school staff, including guidance consultants, and parent groups. Authorities in speciality areas have been invited to address the Project staff and the DCG Committee at monthly meetings.

VII. Articulation

Many activities have occurred during the school year which has articulation, or "the smooth joining of parts, processes, and forces," as their primary purpose. Examples of these included:

A. Between-school orientation activities.

B. Participation of guidance consultants in principals' cabinet meetings.

C. Periodical meetings of project staff members with a liaison committee composed of representatives from business and industry in the Detroit area.

EVALUATION

An additional important aspect of the project has been to evaluate the results of activities. Consequently, a control region has been selected. Control schools were selected to match the experiemental schools as closely as possible. As can be seen in Table 1, differences in regard to the selected census tract data are not great. In order to determine whether or not these differences were significant, rankings were made and the Friedman analysis of variance by rank test was carried out. The results are shown at the bottom of Table 1. Thus, the assumption could be made that students from the experiemental and control schools were comparable.

TABLE 1

	% Pop. Inc. Last Decade 1	% Resident Sq. Mile 2	% 6-17 Years 3	Med. Family Income 4	% Prof. & Manag. 5	% Labor & Service 6	% Unemployed 7	% Over 18 not living Both parents 8	Med. Ed. Adults over 18 9	% Living in Sound Housing 10	Disrupted Marriages Per M 11	% Non-White 12
ELEMENTARY SCHOOLS												
E_1	16.4	12,603	18.6	5,903	8.3	16.5	9.2	13.0	8.6	86.8	81.6	88
C_1	-8.3	20,717	22.9	4,815	6.1	23.4	15.0	24.6	9.0	82.6	181.7	98
E_2	-15.8	14,324	22.2	5,091	7.2	20.8	12.5	21.1	8.9	88.2	131.6	100
C_2	-21.6	15,572	22.3	4,982	9.1	20.8	12.8	23.8	8.8	76.5	157.6	95
E_3	-17.4	15,751	19.9	5,982	7.2	28.4	18.0	15.8	8.8	69.1	123.4	84
C_3	-21.6	15,572	22.3	4,982	9.1	20.8	12.8	23.8	8.8	76.5	157.6	95
JUNIOR HIGH SCHOOLS												
E_4	-32.3	17,866	17.3	4,379	8.0	28.8	16.3	34.8	8.9	68.0	204.9	100
C_4	- 8.3	20,717	22.9	4,815	6.1	23.4	15.0	24.6	9.0	82.6	99	81.7
E_5	-13.0	8,815	18.5	6,174	11.3	13.9	9.2	13.1	9.1	86.0	94.0	61
C_5	-17.3	13,455	19.7	5,853	9.3	15.0	10.7	11.8	8.7	82.7	86.4	70
SENIOR HIGH SCHOOLS												
E_6	-24.5	5,965	21.9	5,016	7.9	21.5	14.9	22.1	8.4	62.5	75	75
C_6	- 9.8	9,569	20.7	4,690	18.6	18.9	14.8	32.5	9.6	72.2	95	85
AVERAGE												
Control	-19.9	12,554	20.1	5,441	8.3	21.5	13.3	20.0	8.8	75.9	141.8	78
Exp.	-14.5	15,933	21.8	5,023	9.7	20.4	13.5	23.5	9.0	78.8	163.0	88

Friedman Analysis of Variance by Rank **Test**

$W=\frac{12\ D^2}{R^2(C^3-C)}$, $W=\frac{12\ (1841)}{144\ (1716)}$, $W=\frac{22092}{247104}$, $W= .089$ (Not Significant)

Students from both experimental and control schools were tested with the Guidance Surveys, a series of complementary questionnaires designed to ascertain students' perceptions of level of occupational aspiration. The Career Guidance Surveys utilized results from the North-Hatt studies and asked students to select occupations to which they aspired. The CG Survey, Level I, utilized pictures and stories; the CG Survey, Level II and III, were presented in written form. A summary of the results follow. (A much more complete description of the project is available from the Wayne State University library.)

TABLE 2

EXPERIMENTAL AND CONTROL SCHOOL RESULTS OF PRE AND POST TEST ADMINISTRATION OF THE CAREER GUIDANCE SURVEY, LEVEL I

Grades K-3 N's Noted

NORC Level of Aspiration Quartile

	N			I			II			III			IV		
	1965	1966	1967	1965	1966	1967	1965	1966	1967	1965	1966	1967	1965	1966	1967
E_1	298	270	238	28%	31%	31%	25%	27%	39%	22%	24%	23%	25%	20%	17%
C_1	165	152	133	28	29	25	26	23	22	22	23	26	24	25	27
E_2	365	325	291	25	26	27	22	23	21	25	24	23	28	26	29
C_2	330	313	303	25	26	24	21	23	24	24	22	24	30	29	28
E_3	320	310	303	24	27	28	23	28	29	25	24	23	28	22	20
C_3	255	243	225	28	28	25	24	22	25	22	23	23	26	27	27
Total Exp.	983	905	832	26	28	29	23	27	27	23	24	23	28	21	21
Total Control	750	708	661	26	27	24	23	23	24	23	23	25	28	27	27

Thus, the results show that the experimental school populations did experience a significant rise in their levels of aspiration than the control schools. The results at the first quartile were inconclusive after one year, but significant differences emerged after two years. The results at the fourth quartile, and on several occasions, at the fourth and second quartiles, indicate that the students in the experimental schools did, indeed, hold higher levels of aspiration after the experiment than they did previously. Indeed, in instances throughout the eleventh grades, the level of aspiration of students in control schools went down. Thus, perhaps the greatest contribution of the Development Career Guidance Project has been in helping combat the deteriorating process that so often occurs in regard to the aspiration and, following, the achievement of inner-city youth.

TABLE 3

EXPERIMENTAL AND CONTROL SCHOOL RESULTS ON PRE AND POST TEST ADMINISTRATION OF THE CAREER GUIDANCE SURVEY, LEVEL II

Grades 4-6 N's Noted

NORC Level of Aspiration Quartile

	N			I			II			III			IV		
	1965	1966	1967	1965	1966	1967	1965	1966	1967	1965	1966	1967	1965	1966	1967
**E_1	232	220	205	28%	29%	31%	29%	35%	31%	24%	21%	22%	19%	15%	16%
C_1	197	172	159	30	30	29	27	27	26	25	26	22	18	17	23
*E_2	215	210	188	24	26	21	24	23	28	24	26	27	28	25	24
**C_2	280	264	254	27	25	25	30	25	26	23	23	20	20	27	29
*E_3	415	411	383	30	32	32	25	27	29	24	22	20	21	19	19
*C_3	290	275	233	30	28	27	26	27	26	24	26	23	20	19	24
**Total Exp.	862	841	776	29	29	30	25	28	30	25	24	22	21	19	18
**Total Control	767	711	646	29	27	27	28	27	26	23	23	22	20	23	25

Thus, the results of the Level II survey seem to parallel, in several regards, the results, of the Level I survey. There has been more growth in regard to occupational aspiration among the students in the experimental schools than those in the control schools. This growth leads to the conclusion that a comprehensive guidance program can help compensate for the effects of factors such as socio-economic environment and familial values. The importance of this conclusion is underlined by the Coleman report: "Of all the variables measured in the (Equality of Educational Opportunity) survey, the attitudes of student interest in school, self-concept and sense of environmental control show the strongest relations to achievement (2)." One test of this conclusion that concerned the Developmental career Guidance staff whether or not changes in perception would be accompanied by changes in behavior. The following preliminary date indicate that they are in the following important areas:

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*Difference significant at .05, Kolmogorov-Smirnov Two Sample Test
(Large Sample two-tailed test)

**Difference significant at .01 local

		Drop Out Rate	Plan to Enter College	Plan to Enter Other School	Plan to Obtain Employment	Jobs Promised	Other	N
Experimental School	January 1965	49%	36(11%)	37(12%)	220(68%)	40(12%)	26(8%)	319[1]
	January 1968	30%	57(33%)[2]	34(20%)	78(45%)	45(26%)	2(1%)	171
Total Detroit Graduates	January 1965[3]		723(28%)	226(9%)	1419(55%)	319(23%)	212(8%)	2580
Control School	January 1965	45%	7(10%)	11(16%)	41(58%)	8(11%)	12(17%)	71
	January 1968	45%	18(20%)	11(13%)	53(61%)	10(9%)	5(6%)	88

[1] These figures represent the graduating classes from two high schools from which the experimental school population was drawn.

[2] This figure represents not plans, but actual acceptances to colleges and universities.

[3] Comparable data on all January graduates will not be available until the Fall of 1968.

Preliminary indications are that school achievement as well, is being affected:

Composite Achievement Test *Stanine Changes 1965-1967

	Experimental	Control
Grade 4B to 6B	-.06	-.78
Grade 6B to 8B	+.38	-.10
Grade 8B to 10B	-.01	-.61

These data indicate that, as the aspiration levels of students' rise, there can possibly be an effect on school achievement. If must be emphasized that these are preliminary data and that more complete data will be forthcoming. The longitudinal differences in achievement test scores shown above, however, are not significant.

The CG Survey, Level III

The results indicate considerable progress in regard to affecting student perceptions and behavior:

1. The level of aspiration of students in experimental schools did increase significantly more than of students in control schools.

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* Iowa Basic Skills and Sequential Tests of Academic Progress

2. Students in experimental schools did seem to show more growth in regard to occupational knowledge and planning than students in control schools.
3. The students in experimental schools did seem to re-examine their value structure significantly more than students in control schools.
4. Students in experimental schools did show a more acceptable attitude towards counselors at the end of the project's first year of opperation than did students in control schools. Interestingly, there did not seem to be a significant change in perception of school.

CONCLUSIONS

The initial results would seem to warrent further investigation into the effectiveness of various approaches to school counseling. It would seem that in school counseling, as well as in other settings, the counseling approach does make for significant differences in client acceptance. Throughout the project, a developmental approach to counseling and guidance wherein an attempt is made to reach all students would seem to have proven more effective in meeting students' needs.

Further, the results seem to indicate that the concept of guidance as an educational change agent is a viable one _if_ a program and series of activities designed to achieve certain clearly stated objectives is effected.

Implicit is this point of view is the acceptance of the idea that the school counselor can be a guidance specialist who gives information, etc., as well as one who provides meaningful counseling for all students. Too often we seem to compartmentalize students as to the particular "problem" they are facing at any one time and neglect the growth of the whole person. Emphasis should be placed on total development of the individual. In this view, the individual is perceived as facing "problems" at every stage of his development.

Following he needs -- and appreciates -- professional help at all stages of his progress, in achieving competence, in regard to mastering his vocational developmental tasks. In this regard, career development can be seen as a focal point around which to organize the activities of the full-functioning guidance program.

In essence, the initial results of the project reinforce the position of the counselor not only as a counselor, but also as a guidance services specialist. Although lip service has been paid in the field to counseling as the heart of the guidance program, many counselors have not been secure in counseling with a resultant emphasis upon guidance services. On the other hand, many counselors have eschewed guidance and retreated to the safety of their offices and restricted their activities to counseling with a relatively small number of students. All too many counselors, counselor educators, and administrators have acquiesced in either perception, having thrown up their hands to what they term "reality". As a result, we now see a movement in the direction of making guidance and counseling mutually exclusive. However, with an adequate educational background and supervised counseling experience, as well as a clearly defined role and objectives, the counselor of today should have the competence to be comfortable in counseling as well as organize guidance services that provide meaningful programs for all students. Only in this way can the fully-functioning guidance program fulfill its responsibilities to youth.

In far too many school situations the guidance program has either not been given the opportunity to truly evolve into an activity that affects all aspects of the school or has been restricted ot servicing a small segment of the student population. The Coleman report emphasizes that, "a pupil attitude factor which appears to have a stronger relationship to achievement than do all the "school" factors together is the extent to which an individual feels that he has some control over his destiny". (2)

Although the Developmental Guidance Project has been concentrating on servicing disadvantaged youth, the project staff feels strongly that the foregoing conclusion applies to all youth in all school situations. The tremendous waste of human resources attested to by the high college drop-out rate is silent testimonial to the validity of this feeling. All youth need the opportunity to appraise themselves, to consider possible future alternatives, to gain meaningful information concerning their world, and to make plans for themselves. With disadvantaged youth the problem is, of course, more critical for their "margin for error" is much less. With them there are fewer familial and community resources to help compensate for the failure of the educational system to effect the guidance function.

In my opening remarks I spoke about freedom -- I believe that true freedom is helping our students to gain the information and the experiences that will enable them to make a cumulative series of decisions that will enable them to gain the feeling that they are, in truth, gaining at least some control over their progress. We find that a great number of students feel they do not have any freedom of choice and are not allowed to make decisions -- either educational or vocational that will affect their future. What we can and must do is provide our students with the experiences, the information, and the opportunities to make decisions about their own progress.

Phillip Vernon has rightfully pointed out that an individual's perception of the future will affect his performance in the present as much as his past experiences (12).

I would submit that using career development theory as a rationale for a fully-functioning program of guidance activities we can, in truth, enable our students to become free.

This manual is an attempt to point out the importance and applicability of certain activities in the elementary school that will help to further the progress of every child. Miss Jefferies and Miss Spedding have rendered an outstanding service through their efforts. We are hopeful that this manual will, then, facilitate the cooperative efforts of teachers and counselors in fulfilling their responsibilities to youth.

BIBLIOGRAPHY

1.	Briggs, William A. and Hummel, Dean L.	Counseling Minority Group Youth, Columbus, Ohio: Heer Printing Co., 1962.
2.	Coleman, James C.	Equality of Educational Opportunity, Washington: Government Printing Office, 1967.
3.	Ginzberg, Eli, et al	The Negro Potential, New York: Columbia University Press, 1956.
4.	Gordin, Burton I.	"Equality of Opportunity", Address delivered at Wayne State University, Aug., 1964.
5.	Johnson, Lyndon B.	Manpower Report of the President, Washington: Government Printing Office, March,1967.
6.	Kagan, Jerome and Moss, Howard	Birth to Maturity, New York: Wiley, 1962.
7.	Leonard, George E.	Equality of Opportunity: Final Report of a Workshop for the Analysis and Study of Employment Problems of Minority Youth. Detroit: Wayne State University, Sept., 1964. (mimeo.)
8.	________________________	Developmental Career Guidance in Action. Detroit, Wayne State University, 1967.
9.	Super, Donald	The Psychology of Careers, New York: Harper, 1957.
10.	________________________ and Bachrach, Paul	Scientific Careers and Vocational Development Theory, New York: TC Bureau of Publications, 1957.
11.	Van Hoose, William and Leonard, George	"Vocational Guidance in Elementary Schools", Guidance Journal, Vol. 5, Fall, 1966. pp. 61-65.
12.	Vernon, Phillip	"Ability Factors and Environmental Influences," The American Psychologist, Vol 20, No. 9, September, 1965.

APPENDIX B

THE NEEDS OF INNER-CITY CHILDREN FOR CAREER GUIDANCE*

It is not the purpose of this manual to define what is meant by the inner-city child. Educators have already heard and debated the proper labels to describe this particular type of child who is the "thorn" in the school system's side. This child has been described as "culturally deprived," "culturally disadvantaged," "educationally deprived," "poor," "Negro," and in some parts of the Lone Star State he is described as "Mexican." Whichever label is used, it often becomes an excuse for some people to say -- "Well, what's the use? What can you expect from this child anyhow?"

To ensure communication for the duration of the paper, let us think of the inner-city child as one who does not have enough of the opportunities and advantages normally available to most children who are in the mainstream of American culture. A closer look at his background usually shows not one but a combination of several disadvantages. Socially, he is from the under-privileged area of the city, a minority ethnic group, and frequently from a home where the father and the necessary parental guidance are absent. Intellectually, he is below average as measured by standardized test results.

Consequently, the inner-city child experiences academic failure in school because he has difficulty performing academically, he is often rejected by his teachers. He becomes involved in misbehavior that brings him to the attention of school disciplinarians. Failure after failure induces the child to lose interest in education as a means of preparing for the future.

President Johnson stated "I regard waste as the continuing enemy of our society and the prevention of waste - waste of resources - waste of lives or waste of opportunity - to be the most dynamic of our responsibilities.

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*Adapted from a paper presented by Doris Jefferies at the 1967 APGA Convention, Dallas, Texas.

Enrollment in the biological sciences, in engineering, and in other such fields has been declining rather than increasing during the last 10 years despite the known need and increased demand from space, defense, and industrial research...The situation in medicine is grave...America needs the resources of all its young minds without regard to color or heritage or religion." (2)

There is a need now in our society to develop and utilize the talent of all people. It is the basic principle on which lies the hope of achieving the ideal of a completely democratic and dynamic society. There is, in addition, a need to assist every individual to develop to the height of his own potential. A true democracy demands the opportunity for self-actualization for every citizen with the main vehicle for such expression being meaningful work. Consequently, education has the responsibility of assisting individuals to prepare themselves for the world of work both intellectually and socially.

Of course, most teachers, administrators, and counselors can recite the purposes of American education glibly and defend them nobly. However, the very same educators can be overheard in the teachers' lounge crying -- "What's the use? What can you expect from this child anyhow?" The answer to such a question must be, "Little can be expected if little is expected." The expectation level of the adults surrounding the child becomes significant because it influences the child's own expectations, aspirations, and self-concept. The child grasps quickly how others perceive him and then behaves accordingly. The, "What's the use?" attitude breeds apathy in the inner-city child. The child is not born this way. As a song from the musical, "South Pacific" says, "You've got to be carefully taught."

The Developmental Career Guidance Program in Detroit* suggests that there may be a cause-effect relationship between level of aspiration and level of achievement. In regard to inner-city youth where a child is told, "You cannot succeed in a particular occupation or in a school subject," ... he often accepts this and also accepts a lower level goal or occupation.

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*Leonard, George. Developmental Career Guidance in Action, Wayne State Univ.

There is a vast waste of talent in inner-city youth today because the level of aspiration and achievement which is so cruical to career development is related to self-concpet. Research has consistently shown that the inner-city child has a low self-concept. He does not see himself as an achiever, and is not encouraged by his environment to do so. The following examples from one inner-city school illustrates the effects of this treatment:

> A kindergartener explained to his teacher that he could not do his work because he was "lazy."
>
> A ten-year-old boy interested in biology expressed disappointment because his mother had told him he could not be a biologist and laughed at him, so he began to underachieve.
>
> A sixth grade class appeared embarrassed and laughed uncomfortably when a filmstrip of Negroes at work was shown. It was the first time they had seen Negroes in a school filmstrip.
>
> Second graders were asked to draw pictures to answer the questions, "How do you look now?" and "How would you like to look?" A number of children "changed" from Negro to Caucasian. Several of the boys chose to be "Pimps" with long hair and flashy clothes.
>
> Teachers say, "What's the use? They just don't have the intelligence to understand what I'm trying to teach."

Discourageing the child to learn has too long been the business of Big City, U.S.A. The inner-city child has too long been denied the right to discover the cure for cancer, to prevent fires in space capsules, and to conduct peace conferences with other nations. How much longer can our society afford to continue to discourage this child? We have already paid a high price for it.

An analytical look at the inner-city child shows a real conflict between him and his teachers. Teachers generally come from the middle class, and are protagonists for those values of the middle class Protestant ethic. (1) The child comes from a literally different, and the values with which they have grown are often at considerable difference from those which pervade the usual school atmosphere. Thus, our educational system which next to the family is the most effective agency in teaching good work habits to middle class people, is largely ineffective and unrealistic with disadvantaged groups.

Little in the inner-city boy's environment is likely to give him any sense of aspiration or any direction: he has no male model to emulate and little reason to assume that education offers a way out of the slum. His lack of education and aspiration, in turn, makes it virtually impossible for the youth to find a job with dignity and status, even where discrimination is absent. All to often, therefore, he decides that there is no point in trying, and he loses the capacity to take advantage of such opportunities as to arise. (3)

On the other hand, Super describes the male role of the middle-class family. The father, and often other members of the household, have jobs. As workers outside of the home they have their roles about which they talk, and they frequently bring their work into the home, whether in the form of papers in a briefcase, customers who must be seen in the living-room, or jobs to be done in the basement shop. Thus, the middle class child has opportunities to hear about and to observe roles other than those which are performed as a part of the regular domentic routines. (4) He is "future" oriented.

The inner-city boy child is frequently deprived of a successful male role-model to encourage and guide him to develop vocationally, however, he does seek out male identification. He finds it on the street corner. A "real" man has a black leather coat, drives a convertible Cadillac, and uses certain fourletter words constantly in his conversations. Consequently, the inner-city child lives for today with littel thought of tomorrow. He is "today" oriented.

Such is the vicious circle in which the inner-city child is trapped. His environment actually discourages him from seeking higher education and a job with security and status. The low self-concept that has been nurtured by the inner-city in turn lowes his level of aspiration and career development, thus, perpetuating the self-defeating mode of living. His potential contributions to the American culture are, therefore, lost.

The schools must help break the vicious circle of apathy in the inner-city by assisting the child in his career development. Tasks to promote this developemnt should begin as soon as the child enters kindergarten. His education must be meaningful and realistic if he is to be encouraged to raise his educational and occupational aspirations. The young child should be given the opportunity to role play those occupations that are related to his curriculum. A discussion of the career being acted out in relation to the world of work is necessary in dealing with the concept of "work." Teachers, counselors, and administrators must help the child to become aware of himself as a future worker through various career development tasks.

To further implement the child's vocational self, role models become essential to the educational program. When the child can see, hear, touch, and smell real people from the inner-city who are meeting success in the world of work, he can more readily understand the need and real meaning of education. It is not enough to show him pictures of Ralph Bunche, assorted athletic heroes, and entertainers or to dramatize the rise of Abe Lincoln. The past has proven the insignificance of such incidental pictorial occupational information in the inner-city. The child needs the experience of the real, concrete world rather than the abstract. "Seeing is believing."

In its second year the Developmental Career Guidance program is making a systematic attack on the problem of assisting the inner-city child to prepare for work success by beginning with the elementary school child. It is the major function of the elementary school guidance consultant to plan career guidance activities. The purpose of such activities is to raise the inner-city child's self-concept so that he too may one day contribute to and enjoy the rewards of the democratic way of life.

The results show that the experimental school populations did gain more in their aspiration levels than the control schools. The results at the first quartile are inconclusive, but the results at the fourth quartile, and on several occasions, at the fourth and second quartile, indicate that the students in the experimental schools did, indeed, hold higher levels of aspiration after the experiment than they did previously. Indeed, in several instances the level of aspiration of students in control schools want down. Thus, perhaps the greatest contribution of Developmental Career Guidance Project has been in helping combat the deteriorating process that so often occurs in regard to the aspiration and, following, the achievement of inner-city youth. (5)

The consultant assists the school and community to understand the need to help each child experience the vocational developmental tasks as described by Super. (4) It is the role of the Developmental Careet Guidance consultant to:

1. Provide individual and group counseling to help children understand, accept, and appreciate their individual dignity and worth.
2. Arrange field trips to business, industry, and educational institutions with emphasis on job activity and qualification.
3. Locate role models from the inner-city and invite them into the classrooms to help children see that "success" stories can be real for them, too.
4. Develop special programs, classes, and work activities in school for the specific purpose of guiding the children through the career development.
5. Provide occupational information and other guidance services to help teachers make lessons more purposeful and realistic.
6. Organize small parent discussion groups and have individual consultations centering around the parent's role in career guidance.

A preventively oriented program such as Developmental Career Guidance seems to be a real step toward "nipping the problem in the bud" by assisting the child through specific work-oriented tasks. Then, when he has completed the tasks, he will have the self-understanding and occupational information to choose a satisfying career.

We realize now that it was not enough to write the inner-city youth off of society's conscience with welfare checks and poor boxes. We realize now as we grow closer to a real democracy, the need to utilize the talent of each individual if the mainstream of American culture is to flow gently, steadily, and endlessly.

REFERENCES

MAGAZINE ARTICLES

1. Bowman, Paul H., and Pellman, Maurine, "Socially Underprivileged Youth and the Schools:" *High School Journel*, published by University of North Carolina Press, V. 41, May, 1958, p. 331.

2. Johnson, Lyndon B., President, "Excerpts of Speeches," *Texas Quarterly*, V. 1, NO. 4, Winter, 1958.

3. Silberman, Charles E., "The Cith and the Negro," *Fortune* Magazine, reprinted by Time, Inc., March, 1962.

BOOK

4. Super, Donald E., *The Psychology of Careers*, Harper and Row, Publishers, New York and Evenston, 1957.

BOOKLET

5. Leonary, George E., *Developmental Career Guidance in Action*, Wayne State University, Detroit, Mich., 1966.

Elementary

Role Playing is a Learning Activity

OVERVIEW

Role playing is a learning activity for use by both the teacher and child in all areas of the curriculum. It can and should be included in each subject area. Once the teacher utilizes role playing techniques and observes them as successful, more confidence in the approach will be gained each day.

Actual instances of how to role play in the classroom and when it is of particular importance have been noted and suggested throughout this material.

OBJECTIVES

In the elementary school:

1. Improve language skills - to help children to think better on their feet, to talk easier with others, to listen and respond.
2. Increase imagination and creativity - to help children to think for themselves; those that have been unable to do some things can be successful with this approach.
3. Makes available for educationally deprived a sense of self-contribution to group participation; helps the child to understand his place in life.
4. Preparation for citizenship; leadership - group interaction enhanced.
5. Teach human values - respect fellow man; interact with others.
6. Preparation of art form - appreciation of music, art, drama, literature.
7. Sensitivity and awareness of the World of Work.

Purposes for Children

1. Offers an opportunity to gain a sense of achievement - through success.
2. Fun to participate.
3. Desire to make decisions for self', to think on their feet in face to face situations.
4. Group activity with an adult leader - not organized play.

DEVELOPING A LESSON

Procedure:

1. It is imperative to help children to become initially relaxed through warmup activities.

Example:

- Children stand in a circle. One child pretends he has a ball. They throw the ball to each other in the circle.
- Children stand and pretend they have a heavy box to put on a high shelf.

2. Development: Basically, movement with child's own dialogue.

Examples:

Early Elementary: A shoe salesman. One child is buying, the other selling. This can be accomplished with groups or individuals.

Later Elementary: Production line at an auto plant Children are putting parts on cars. (perhaps on dashboard)

3. Culmination: This can be a repetitive process by using other in class to do the same thing but using different dialogue.

Discussion by entire groups of children with constructive criticism.

HELPFUL HINTS FOR THE TEACHER

1. Develop in a spiral effect - begin with short time, 10 minutes, and build up to greater spans of time.

2. Never force any child who does not want to participate.
3. Give good directions; be sure each child knows exactly what he is to do.
4. Give only a short time to plan so it is more creative.
5. Be sure activity (or job) is within age level so the child does not appear foolish to peers.
6. When children are evaluating a role-playing activity encourage positive reactions.
7. Allow for much change and creative dialogue to bring out each child's personality.
8. Encourage feelings of the role models, not just dialogue, so emotions come through.